Service Reference Guide

3rd Quarter, 2002

WARNING: Text set off in this manner indicates that failure to follow directions could result in bodily harm or loss of life.

CAUTION: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

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1

Installing the Operating System

Depending on the model, Microsoft Windows 98, Microsoft Windows Me, Microsoft Microsoft Windows NT, Windows 2000 Professional, Windows XP Home, or Windows XP Professional is preinstalled on the computer and will be configured automatically the first time the computer is turned on.

CAUTION: Do not add optional hardware devices to your computer until the operating system is successfully installed. Doing so may cause errors and may prevent the operating system from installing properly.

CAUTION: Once the automatic installation has begun, DO NOT TURN OFF THE COMPUTER UNTIL THE PROCESS IS COMPLETE. Turning off the computer during the installation process might damage the software that runs the computer.

1.1 Microsoft Windows 98/Me

The first time the computer is turned on, Microsoft Windows is automatically installed. This takes approximately 10 minutes, depending on the system hardware configuration. At the beginning of the installation process, you are prompted to select the appropriate language for the operating system. Read and follow the instructions that appear on the screen to complete the installation. During this process, do not turn off your computer unless you are directed to do so.

1.1.1 Installing or Upgrading Device Drivers

To install hardware devices such as a printer, a display adapter, or network adapter after the operating system installation is completed, the operating system needs access to the appropriate software drivers for the devices.

The Windows Cab files directory and its subdirectories provide the HP- or Compaq-specific integration of the operating system and include supported device drivers. The Cab files directory path is c:\Windows\Options\Cabs.

1.2 Microsoft Windows NT Workstation 4.0 or Windows 2000 Professional

The first time the computer is turned on, Microsoft Windows is automatically installed. This takes approximately 10 minutes, depending on the system hardware configuration. At the beginning of the installation process, you are prompted to select the appropriate language for the operating system. Read and follow the instructions that appear on the screen to complete the installation. During this process, do not turn off your computer unless you are directed to do so.

If you are installing a SCSI controller you must install the SCSI device drivers before you load Windows NT onto the workstation. If you do not have the drivers on a diskette, they may be downloaded from www.hp.com.

To load the SCSI device drivers and Windows NT:

1. Insert the Windows NT CD into the drive and start the computer.
2. When the words “Setup is inspecting your computer’s hardware configuration…” display, press F6. This will prompt Setup to ask for the drivers.
3. Follow the online instructions for installing the drivers.
4. When prompted, choose “S” to specify an additional device.
5. Choose “Other.”
6. Select the device controller from the list presented.
7. Press Enter to continue the installation.
8. Continue with the normal Windows NT installation process.

The first time you turn on the computer, you will be prompted to select a language for the operating system and then you will be offered a choice of installing either Microsoft Windows NT 4.0 or Windows 2000 Professional. Read and follow the instructions on the screen to complete the installation of the operating system. During this process, do not turn off the computer unless you are directed to do so.

1.2.1 Installing or Upgrading Device Drivers

To install hardware devices such as a printer, a display adapter, or network adapter after the operating system installation is completed, the operating system needs access to the appropriate software drivers for the devices.

The I386 directory and its subdirectories provide the HP- or Compaq-specific integration of the operating system for the computer model and include device drivers supported by Windows NT or Windows 2000.

When prompted for the I386 directory on the operating system CD, replace the path specification with C:\I386 or use the browse button of the dialog box to browse the computer for the I386 folder. For Windows NT 4.0, reapply Service Pack 6A by clicking its icon located on the computer desktop. For Windows 2000, no further steps are required.

Always choose Yes if you are prompted to replace a file with a newer version when reapplying the service pack for Windows NT 4.0.

The service pack for Windows 2000 Professional has been integrated into the program.

1.2.2 Creating an Emergency Repair Diskette - Windows NT

Not all HP and Compaq computers equipped with Windows NT support this feature.

This section applies only to computers equipped with a diskette drive.

After installing Microsoft Windows NT, HP recommends that you create an Emergency Repair Diskette. Using one blank, formatted diskette, complete the following steps:

1. Click Start > Run.
2. In the dialog box, enter:

C:\RDISK.EXE

3. Follow the instructions that appear on the screen.

1.2.3 Using the Emergency Repair Diskette - Windows NT

Not all HP and computers equipped with Windows NT support this feature.

This section applies only to computers equipped with a diskette drive. The Emergency Repair Diskette cannot be used on an LS-120 drive.

To use the Emergency Repair Diskette, insert the diskette in the diskette drive and restart the computer. Follow the instructions displayed on the screen.

1.2.4 Creating an Emergency Repair Diskette - Windows 2000

1. Click Start > Programs > Accessories > Backup.
2. Select the menu option Tools, then select Create an Emergency Disk.
3. Follow the instructions that appear on the screen.

1.2.5 Using the Emergency Repair Diskette - Windows 2000

1. Insert the diskette into the diskette drive and restart the computer (you may boot the computer to the Windows 2000 CD on some computers).
2. Press Enter to start the repair process, then choose to repair the system.
3. Select the Emergency Repair Process.
4. Follow the instructions that appear on the screen.

1.3 Converting to NTFS

1.3.1 Windows NT Workstation 4.0

While most hard drives included with a Windows NT Workstation 4.0 model are preformatted with NTFS, some models contain a primary FAT 16 partition on which the operating system and HP or Compaq software are installed. The rest of the hard drive is divided into one or more additional partitions. Because FAT 16 only supports partitions up to 2 GB, converting to NTFS will allow hard drives larger than 2 GB to be partitioned into larger segments. To convert an existing partition from a 2 GB FAT 16 partition to a 2 GB NTFS partition:

1. Click Start > Run.
2. Type CONVERT.EXE X: /FS:NTFS where X is the drive letter designating the partition you wish to convert.

Alternatively, the *HP Restore CD* can be utilized to repartition the hard drive. The largest NTFS partition possible is 7.5 to 8.0 GB, depending on the hard drive, with a second NTFS partition created from the remaining space on the drive.

CAUTION: The following procedures will remove all of the software applications and data files from your hard drive. Be sure to back up any data files you have created prior to converting from FAT16 to NTFS, or you will not be able to restore them.

You will be able to restore the operating system and drivers required to access the Internet from the *HP Restore* CD. The operating system (without HP software or optimized drivers) may be restored from the operating system installation CD or diskettes.

If the computer does not have a CD-ROM drive, other means of installation, such as a network share, will be needed for this procedure. Insert the *HP Restore* CD, version 2.0 or higher, into the CD-ROM drive and turn on or restart the computer. Read and follow the instructions that appear on the screen to change the drive partitioning.

1.3.2 Windows 2000 Professional

To convert an existing partition from a FAT 32 partition to an NTFS partition, double-click the NTFS Convert icon on the desktop. Carefully read and follow the directions that appear on the screen.

1.3.3 Windows 98 and Windows Me

Windows 98 and Windows Me are not able to access a NTFS partition on the hard drive. Both Operating Systems will read both FAT 16 and FAT 32 partitioning but only FAT 32 is supported. As you can not change from Windows NT 4.0 to Windows 98 or Windows Me, the only time this should be an issue is when the user formatted the drive with Windows NT 4.0 and then did a clean installation of the new operating system.

1.3.4 Windows XP Home and XP Professional

The Windows XP Home and XP Professional operating systems handle only NTFS-formatted drives. When installed, XP will, if necessary, automatically convert a FAT32 drive to NTFS.

1.4 hp Software

The Microsoft Windows 98, Windows Me, Windows NT Workstation 4.0, Windows 2000 Professional, Windows XP Home, or Windows XP Professional operating system is preinstalled on the computer and will be configured automatically the first time the computer is turned on. The following HP software will also be installed at that time on selected models:

- Computer Setup Utilities and diagnostic features
- HP Support Software including device drivers
- Configuration Record
- Online *Safety & Comfort Guide*
- HP Intelligent Manageability
- Enhanced HP Insight Personal Edition (Diagnostics for Windows)
- DMI Support
- Power Management with energy saver features
- Security Management tools
- Software Support Management tools

Certain drivers and utilities are available only in selected languages. You can obtain the latest version of these files, in English and selected other languages, in one of three ways:

- *Support Software CD for HP or Compaq Desktop, Portable, Workstation, and Handheld Products*
- HP web site at www.hp.com
- *Compaq Deskpro Supplement CD*, which is supplied with many Compaq models

Additional HP software may be required in certain situations.

Example: The Evo D510 e-PC is a legacy-free system that does not include an 8042 keyboard controller. MS-DOS applications that require an 8042 keyboard controller will not run and keyboard fuctionality will be lost. A SoftPaq 8042 emulation program is available from HP (at www.hp.com) that will support applications that require the 8042 keyboard controller.

2

Setup Utilities and Diagnostics Features

Setup Utilities (F10) and diagnostic features provide information needed about the computer system when contacting Customer Support. These tools can also be used to:

- Change factory default settings and to set or change the system configuration, which may be necessary when you add or remove hardware.
- Determine if all of the devices installed on the computer are recognized by the system and functioning properly.
- Determine information about the operating environment of the computer.
- Solve system configuration errors detected but not automatically fixed during the Power-On Self-Test (POST).
- Establish and manage passwords and other security features.
- Establish and manage energy-saving timeouts.

All features identified in this chapter may not be available on all HP and Compaq products.

Power-On Self-Test (POST)

POST is a series of diagnostic tests that runs automatically when the system is turned on, POST checks the following items to ensure that the computer system is functioning properly:

- Keyboard
- Memory modules
- Diskette drives
- All IDE and SCSI mass storage devices
- Processors
- Controllers

If the Power-On Password is set, a key icon appears on the screen while POST is running. You will need to enter the password before continuing. Refer to Chapter 3 for information on setting, deleting, or bypassing the password.

If POST finds an error in the system, an audible and/or visual message occurs. Refer to Appendix C for POST error messages and their solutions.

2.1 Computer Setup Utilities

Use Computer Setup Utilities (F10) to:

- Modify or restore factory default settings.
- Set the system date and time.
- Set, view, change, or verify the system configuration including settings for processor, graphics, memory, audio, storage, communications, and input devices.
- Modify the boot order of bootable devices such as hard drives, diskette drives, CD-ROM drives, DVD-ROM drives, or PD-CD drives.
- Configure Quiet Drive options (for drives that support this feature).
- Enable Quick Boot which is faster than Full Boot but does not run all of the diagnostic tests run during a Full Boot. You can set your system to:
  - ❏ always Quick Boot (default);
  - ❏ periodically Full Boot (from every 1 to 30 days); or
  - ❏ always Full Boot.
- Enable or disable Network Server Mode, which allows the computer to boot the operating system when the power-on password is enabled. The keyboard and mouse remain locked until the power-on password is entered.
- Select POST Messages Enabled or Disabled to change the display status of Power-On Self-Test (POST) messages. POST Messages Disabled suppresses most POST messages, such as memory count, product name, and other non-error text messages. If a POST error occurs, the error is displayed regardless of the mode selected. To manually switch to POST Messages Enabled during POST, press any key (except F10 or F12).
- Establish Ownership Tag, the text of which is displayed each time the system is turned on or restarted.
- Enter the Asset Tag or property identification number assigned by your company to this computer.
- Enable power-on password prompting during system restarts (warm boots) as well as during power-on.
- Establish a setup password that controls access to Computer Setup and the settings described in this section.
- Secure the integrated I/O functionality, including the serial, USB, or parallel ports; audio; or embedded NIC, so that they cannot be used until they are unsecured.
- Enable or disable Master Boot Record (MBR) Security.
- Enable or disable removable media boot ability.
- Enable or disable removable media write ability.
- Solve system configuration errors detected but not automatically fixed during the Power-On Self-Test (POST).
- Replicate your system setup by saving system configuration information on diskette and restoring it on one or more computers.
- Execute self-tests on a specified IDE hard drive.
- Configure various energy-saving features including energy saver mode, system and hard drive timeouts, power button mode, and power LED behavior.

2.1.1 Using Computer Setup Utilities

To access the Computer Setup Utilities (F10)menu, complete the following steps:

1. Turn on or restart the computer. To restart the computer in Windows or Windows NT, click Start > Shut Down > Restart the Computer.
2. When the F10 Setup message appears in the lower-right corner of the screen, press the F10 key. Press Enter to bypass the title screen, if necessary (for English only).

If you do not press the F10 key while the message is displayed, you must turn the computer off, then on again, to access the utility.

Pressing the F12 key initiates Network Service Boot for Remote System Installation.

A choice of five headings appears in the Computer Setup Utilities menu: File, Storage, Security, Power, and Advanced. Section 2.1.2 in this chapter provides more information about the features that are available.

3. Using the arrow keys or the Tab key, select the option you want and press Enter. To return to the Computer Setup Utilities menu, press Esc.
4. To apply and save changes, select File > Save Changes and Exit.
   - ❏ If you selected an option that automatically restarted the computer, changes were applied at that time.
   - ❏ If you have made changes that you do not want applied, select Ignore Changes and Exit.
   - ❏ If you have already applied changes you now want to eliminate, select Set Defaults and Exit. This option will restore the original system defaults.

Be sure to configure new options and drivers in the operating system after they have been configured by the Setup Utility.

2.1.2 Computer Setup Menu

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Heading	Option	Description	
File	System Information	Lists product name/type/speed/stepping, cache size, system ROM family and version, installed memory size, system board revision, chassis serial number, integrated MAC for enabled or embedded NIC (if applicable), and asset tracking number.	
	About	Provides copyright information.	
	Set Time and Date	Allows you to set system time and date.	
	Save to Diskette	Saves system configuration, including CMOS, to a formatted blank 1.44-MB diskette.	
	Restore from Diskette	Restores system configuration from a diskette.	
	Set Defaults and Exit	Restores factory default settings and clears all passwords.	
	Ignore Changes and Exit	Exits Computer Setup without applying or saving any changes.	
	Save Changes and Exit	Saves changes to system configuration and exits Computer Setup.	
Storage	Device Configuration	Lists all installed storage devices. The following options appear when a device is selected:	
		Diskette Type *(For legacy diskette drives only)* Identifies the highest capacity media type accepted by the diskette drive. Options are 3.5" 1.44 MB, 3.5" 720 KB, 5.25" 1.2 MB, 5.25" 360 KB, and Not Installed.	
		Drive Emulation *(IDE devices only)* Allows you to select a drive emulation type for a storage device. (For example, a Zip drive can be made bootable by selecting disk emulation.)	
		Drive Type	Emulation Options
		Hard disk	No emulation options available.
		Diskette	None (treated as diskette drive)
			Disk (treated as hard drive)
		CD-ROM	None (treated as CD-ROM drive)
			Diskette (treated as diskette drive)
			Disk (treated as hard drive)
		Other (e.g., Zip drive)	None (treated as Other)
			CD-ROM (treated as CD-ROM drive)
			Diskette (treated as diskette drive)
			Disk (treated as hard drive)

Heading	Option	Description *(Continued)*
Storage (continued)	Device Configuration (continued)	**Transfer Mode** *(IDE devices only)* Specifies the active data transfer mode. Options (subject to device capabilities) are PIO 0, Max PIO, Enhanced DMA, Ultra DMA 0, and Max UDMA.
		Translation Mode (*IDE disks only*) Lets you select the translation mode to be used for the device. This enables the BIOS to access disks partitioned and formatted on other systems and may be necessary for users of older versions of Unix (e.g., SCO Unix 3.2). Options are Bit-Shift, LBA Assisted, User, and None. ⚠ Ordinarily, the translation mode selected automatically by the BIOS should not be changed. If the selected translation mode is not compatible with the translation mode that was active when the disk was partitioned and formatted, the data on the disk will be inaccessible.
		Translation Parameters (*IDE Disks only*) Allows you to specify the parameters (logical cylinders, heads, and sectors per track) used by the BIOS to translate disk I/O requests (from the operating system or an application) into terms the hard drive can accept. Logical cylinders may not exceed 1024. The number of heads may not exceed 256. The number of sectors per track may not exceed 63. These fields are only visible and changeable when the drive translation mode is set to User.
		Multisector Transfers (*IDE ATA devices only*) Specifies how many sectors are transferred per multi-sector PIO operation. Options (subject to device capabilities) are Disabled, 8, and 16.
		Quiet Drive *(available on select drives only)* • Performance Allows the drive to operate at maximum performance. • Quiet Reduces noise from the drive during operation. When set to Quiet, the drive will not operate at maximum performance. ✎ If the drive does not support Quiet mode, the Quiet Drive option will not be displayed.
	Options	**Removable Media Boot** Enables/disables ability to boot the system from removable media. ✎ After saving changes to Removable Media Boot, the computer will restart. Manually, turn the computer off, then on.
		Primary IDE Controller Allows you to enable or disable the primary IDE controller.
		Secondary IDE Controller Allows you to enable or disable the secondary IDE controller.

Heading	Option	Description *(Continued)*
Storage (continued)	Options (continued)	**Diskette MBR Validation** Allows you to enable or disable strict validation of the diskette Master Boot Record (MBR). If you use a bootable diskette image that you know to be valid, and it does not boot with Diskette MBR Validation enabled, you may need to disable this option in order to use the diskette.
	DPS Self-Test	Allows you to execute self-tests on IDE hard drives capable of performing the Drive Protection System (DPS) self-tests. This selection will only appear when at least one drive capable of performing the IDE DPS self-tests is attached to the system.
	Controller Order	Allows you to specify the order of the attached hard drive controllers. The first hard drive controller in the order will have priority in the boot sequence and will be recognized as drive C (if any devices are attached. The selection will not appear if all hard drives are attached to the embedded IDE controllers.
	SCSI Narrow Termination	Allows you to configure SCSI termination on the external SCSI connector for narrow SCSI drives. The feature should only be enabled if using a narrow SCSI drive to terminate the external SCSI channel.
	Boot Order	Allows you to specify boot order of installed peripheral devices (such as LS-120 drive, diskette drive, hard drive, SCSI drive, CD-ROM drive, or DVD-ROM drive).
Security	Setup Password	Enables setup (administrator) password. See Section 3.4, "Asset Tracking and Security," for more information.
	Power-On Password	Enables power-on password. See Section 3.4, "Asset Tracking and Security," for more information.
	Password Options	Enables/disables network server mode. Specifies prompting for power-on password. See Section 3.4, "Asset Tracking and Security," for more information. This selection will appear only if a power-on password is set and the network server mode is disabled.
	Smart Cover	Enables/disables Smart Cover Sensor and Cover Lock. (Feature supported on select models only.) Lists most recent cover removal. (Feature supported on select models only.) See Section 3.4, "Asset Tracking and Security," for more information.

Heading	Option	Description *(Continued)*
Security (continued)	DriveLock*	Allows you to assign or modify a master or user password for certain hard drives. When enabled, the user is prompted to provide one of the DriveLock passwords during POST. If neither is successfully entered, the hard drive will remain inaccessible until one of the passwords is successfully provided during a subsequent cold-boot sequence. ✎ This selection will only appear when at least one drive that supports the DriveLock feature is attached to the system.
	Master Boot Record Security*	Allows you to enable or disable Master Boot Record (MBR) Security. When enabled, the BIOS rejects all requests to write to the MBR on the current bootable disk. Each time the computer is powered on or rebooted, the BIOS compares the MBR of the bootable disk to the previously saved MBR. If changes are detected, you are given the option of saving the MBR on the current bootable disk, restoring the previously saved MBR, or disabling MBR security, You must know the password if one is set. ✎ Disable MBR Security before intentionally changing the formatting or partitioning of the current bootable disk. Several disk utilities (such as FDISK and FORMAT) attempt to update the MBR. If MBR Security is enabled and disk accesses are being serviced by the BIOS, write requests to the MBR are rejected, causing the utilities to report errors. If MBR Security is enabled and disk accesses are being serviced by the operating system, any MBR change will be detected by the BIOS during the next reboot, and an MBR Security warning message will be displayed.
	Save Master Boot Record*	Saves a backup copy of the Master Boot Record of the current bootable disk. ✎ Only appears if MBR Security is enabled.
	Restore Master Boot Record*	Restores the backup Master Boot Record to the current bootable disk. ✎ Only appears if all of the following conditions are true: MBR Security is enabled. A backup copy of the MBR has been previously saved. The current bootable disk is the same disk from which the backup copy of the MBR was saved.
	Device Security	Enables/disables serial ports A & B; parallel and USB ports; system audio; network controller (some models); and SCSI controllers.
	Network Service Boot	Enables/disables Network Service Boot. (Feature supported on select models only.)

*Option not supported on all products.

Heading	Option	Description *(Continued)*
Security (continued)	System IDs	Allows you to set Asset Tag and Ownership Tag. Allows setting of Chassis Serial Number if current number is invalid. Also allows you to set keyboard locale setting (e.g., English or German) for System ID entry. Allows setting of Ownership Tag and Universal Unique Identifier (UUID). See Section 3.4, "Asset Tracking and Security," for more information.
Power	Energy Saver	Allows you to set energy saver mode to Advanced, Disabled, or Minimal. ✎ In the minimal energy saver mode setting, the hard drive and system do not go into energy saver mode, but the setting allows you to press the power button to suspend the system.This option does not apply under ACPI-enabled operating systems.
	Timeouts	Allows you to enable/disable or manually select timeout values. ✎ This selection will appear only when energy saver mode is set to advanced.This option does not apply under ACPI-enabled operating systems.
	Energy Saver Options	Allows you to set power button configuration (on/off or sleep/wakeup.) Allows user to enable/disable power LED blink in suspend mode. ✎ This selection will appear only if the energy saver mode is enabled. This option does not apply under ACPI-enabled operating systems.
Advanced**	Power-On Options	Allows you to set POST mode (QuickBoot or FullBoot every *n* days where *n* = 1 to 30), enables/disables POST messages, and delay POST. Enables/disables Safe Post, F9 prompt, F10 prompt, F12 prompt, option ROM prompt, UUID, I/O APIC Mode, USB Buffer @ Top of Memory, and Hot-Pluggable MB Floppy. Allows you to select the wakeup boot source (local hard drive or remote server). Allows you to select computer state after a power loss (On or Off). ✎ The suspend/sleep feature of Remote Management cannot be used if If the computer was turned off using a power strip.
	Onboard Devices	Allows you to set resources for onboard system devices (serial port, parallel port, diskette controller, etc.).
	PCI Devices	Lists currently installed PCI devices and their IRQ settings. Allows you to reconfigure IRQ settings for these devices or to disable them entirely. These settings have no effect under an APIC-based operating system.

*Option not supported on all products.
**These options should be used by advanced users only.

Heading	Option	Description *(Continued)*
Advanced (continued)**	Bus Options	Enables/disables PCI bus mastering, PCI VGA palette snooping, PCI SERR# generation, and ECC on select models.
	Device options	Allows you to set printer mode (EEP+ECP), Output only, bidirectional, and NumLock state at power-on. Enable/disable Power Management Events (PME) wakeup events, processor cache, processor number, ACPI thermal mode, and ACPI S3 support. (When ACPI S3 is enabled you may also enable/disable ACPI S3 video repost, PS/2 mouse wakeup, and hard disk reset.) Allows you to select AGP aperture size (4, 8, 16, 32, 64, 128, or 256 MB). Enables monitor tracking.
	PCI VGA Configuration	Allows users to specify which VGA controller will be the "boot" or primary VGA controller. Appears only if there are multiple PCI video adapters in the system.

**These options should be used by advanced users only.

2.2 Computer Diagnostics

The following section applies only to computers equipped with a diskette drive.

HP strongly recommends that you create a diagnostics diskette as soon as you begin to use the computer. This is a bootable diskette that allows you to test and inspect the hardware outside of the operating system by running the Computer Checkup (TEST) or View System Information (INSPECT) diagnostic programs. The diskette will play an important role in the restoration process if you ever experience a major system failure.

Another diagnostic feature is Diagnostics for Windows, described in Section 2.2.4.

2.2.1 Create a Diagnostics Diskette

DOS-Based

To create a bootable, DOS-based Diagnostic Diskette (some models may require two 1.44-MB diskettes), run the SoftPaq executable file found in C:\DIAGDISK\ to extract the necessary files. Insert a blank 1.44MB formatted diskette into the diskette drive, then run C:\DIAGDISK\PDIAG\MAKEDISK.BAT

To obtain the SoftPaq executable filename, run DIR C:\DIAGDISK\SP*.EXE

Windows-Based

Not all versions of Windows support this feature.

Using the Windows 9x/Windows NT/Windows 2000 operating system:

Click Start > Compaq Information Center > Create Diagnostics Disk. Insert a diskette into the diskette drive and follow the instructions on the screen.

2.2.2 Computer Checkup (TEST)

Use Computer Checkup (TEST) in the following instances to:

- Determine if all the devices installed on the computer are recognized by the system and functioning properly. Running TEST is optional but recommended after installing or connecting a new device.

Third-party devices not supported by HP or Compaq may not be detected.

- Save, print, or display the information generated by TEST. You should run TEST and have the printed report available before placing a call to the HP Customer Support Center.
- Reproduce the same environment on another computer for testing.

Before you run TEST, you must create a diagnostics diskette. See Section 2.2.1, “Create a Diagnostics Diskette,” for instructions.

Running TEST

1. Turn off the computer.
2. Disconnect all peripheral devices other than the keyboard and monitor. Do not disconnect the printer if you want to test it or use it to log error messages.
3. Install loop-back and terminating plugs to test external ports if desired.
4. Cold boot the computer from the diagnostics diskette you have created. Press Enter to bypass the title screen, if necessary.
5. Select Computer Checkup (TEST).
6. Select the option to view the device list. A list of installed hardware devices appears.
7. Verify that TEST correctly detected the devices installed. This utility will detect all devices manufactured or supported by HP; devices from other manufacturers may not be detected.
   - ❏ If the list is correct, select OK and go to step 8.
   - ❏ If the list is incorrect, be sure that any new devices are installed properly.
8. Select one of the following from the test option menu:
   - ❏ Quick Check Diagnostics—This option runs a quick, general test on each device with a minimal number of prompts. If errors occur, they are displayed when the testing is complete. This option will only test the first 16 MB of memory.
   - ❏ Automatic Diagnostics—This option runs unattended, maximum testing of each device with minimal prompts. You can choose how many times to run the tests, to stop on errors, or to print or file a log of errors.
   - ❏ Prompted Diagnostics—This option allows maximum control over the device testing process. You can choose attended or unattended testing, decide to stop on errors, or choose to print or file a log of errors.

If attended testing is selected, the test itself may result in data loss.

Follow the instructions on the screen as the diagnostic tests are run on the devices. When the testing is complete, the TEST option menu is displayed again.

9. To exit TEST, press the Esc key to reach the Exit option. Then press Enter.

Refer to Appendix E for a listing of the Diagnostic Error Codes.

2.2.3 View System Information (INSPECT)

Use View System Information (INSPECT) to:

- View information about the system once it has been configured.
- Save, print, or display the information generated by INSPECT. You should run INSPECT and have the printed report available before placing a call to the HP Customer Support Center.
- Assist your HP authorized dealer, reseller, or service provider in analyzing the system by allowing the service provider to reproduce the same environment on another computer for testing.

The information provided by INSPECT includes:

- Contents of the operating system startup files
- Current memory configuration
- ROM versions
- Type of processor and co-processor
- Diskette, CD-ROM, DVD-ROM, tape, or hard drives installed
- Active printer and communications interfaces
- Modem type installed
- Graphics settings
- Windows WIN.INI file details

Categories or items of information displayed by INSPECT are similar to but may vary slightly from those available in Diagnostics for Windows.

Before you run INSPECT, you must create a diagnostics diskette. See Section 2.2.1, “Create a Diagnostics Diskette,” for instructions.

Running INSPECT

1. Cold boot the computer from the diagnostics diskette you have created. Press Enter to bypass the title screen, if necessary.
2. Select View System Information (INSPECT).
3. Select one of the available options using the Esc key:
   - ❏ Print the INSPECT status.
   - ❏ Save the INSPECT status to a file.
   - ❏ Add comments to a parameter status.
   - ❏ Exit the utility.
4. To exit INSPECT, press the Esc key to reach the Exit option. Then press Enter.

2.2.4 Diagnostics for Windows

Diagnostics for Windows is a component of Intelligent Manageability that allows you to view:

- System overview
- AssetControl information
- Input devices
- Communications ports
- Storage devices
- Graphics information
- Memory configuration
- Security management settings
- System health
- Operating system
- Windows version

Depending on the version, Diagnostics for Windows may include diagnostic tests to determine if all the devices installed on the computer are recognized by the system and are functioning properly.

Using Diagnostics for Windows

1. Select the Diagnostics for Windows icon, located in the Control Panel.
2. The screen displays an overview of the computer hardware and software.
3. For specific hardware and software information, select a category from the Categories menu or from the toolbar.

As you move your cursor over the toolbar icons, the corresponding category names appear near the cursor.

4. To display more detailed information in a selected category, click More in the Information Level box.

Categories or items of information displayed by Diagnostics for Windows are similar to but may vary slightly from the information presented in View System Information (INSPECT).

5. Review and print this information.

To print the information, click File, then select Print. Select one of the following options: Detailed Report (All Categories), Summary Report (All Categories), or Current Category. Click OK to print the report you selected.

6. To exit Diagnostics for Windows, click File, then click Exit.

Running Diagnostic Tests

If your version of Diagnostics for Windows includes diagnostic testing utilities, four tabs will appear next to Overview: Test, Status, Log, and Error.

1. Select the Test tab.
2. Select one of the following options:
   - ❏ Quick Test—Runs a quick, general test on each device with a minimal number of prompts.
   - ❏ Complete Test—Runs maximum testing of each device with minimal prompts.
   - ❏ Custom Test—Runs only the tests you select. To select specific devices or tests, find the device in the list, then click the box beside each test to select or deselect it. When selected, a red check mark appears in the box.
3. Select Interactive Mode or Unattended Mode.
4. In Interactive Mode, the diagnostic software will prompt you for input during tests that require it. Some tests require interaction and will display errors or halt testing if selected in conjunction with Unattended Mode.
5. Click the Begin Testing button.
6. Test Status is displayed, showing the progress and result of each test.
7. If errors are found, click the Error tab to display more detailed information and recommended actions. By following the recommended actions, you may be able to solve some problems yourself.
8. Click Print or Save the error information in case you need to contact your HP authorized dealer, reseller, or service provider for assistance.
9. To exit Diagnostics for Windows, click File, then click Exit.

2.3 Protecting the Software

To protect software from loss or damage, you should keep a backup copy of all system software, applications, and related files stored on the hard drive. The *Restore CD* which accompanies many desktop and workstation models enables the user to selectively restore the original system software. You can order a replacement copy of the *Restore* CD from HP at nominal cost for all of the software preinstalled on the computer. Refer to the operating system or backup utility documentation for instructions on making backup copies of data files.

2.3.1 Ordering Backup Software

You can order all software that shipped with the product from HP as a single set, or you can order the various software packages separately.

Before calling HP to place your order, be sure to have the serial number of the computer available. This number is necessary for all diskette purchases.

2.3.2 Restore CD

The *Restore CD* that is shipped with select computers offers easy deployment and recovery of the system software. Along with the Microsoft operating system CD, the *Restore CD* enables the user to selectively restore the original system software. This can be extremely helpful in the event of hard drive failure or corruption. Required drivers that are not included on the *Restore CD* may be downloaded from the HP Web site at www.hp.com

The *Restore CD* is specific to each desktop and workstation model and accompanies many computers along with the Microsoft operating system CD.

2.3.3 Restore CD for Windows NT

The *Restore CD for Windows NT* that is shipped with select HP Intel-based workstations is a set of HP specific drivers that enables the workstation to operate at optimum performance. Updates are available on the HP web site at www.hp.com and through subscription to the Support Software CD Kit.

The *Restore CD for Windows NT* installation program automatically detects the components on the workstation and determines if the drivers (support software) need to be updated.

When servicing the workstation, be sure it is running the latest version of the *Restore CD* for optimum performance. To determine the version of the Restore CD installed, look at the version in the file properties of the *SETUP.EXE* file in the \WINNT\SYSTEM32\CPQNTSSD workstation directory.

The CD has these capabilities:

- Remote capability—Allows the ability to install, remove, update, and configure components remotely by machine name (computer name). Supports distributed computing environments (DCE) perspectives.
- Silent Setup Command Line Interface—Provides the functionality of the Graphical User Interface (GUI) in a silent command line interface and provides execution output in a log file. Provides the ability to remotely install or update drivers on multiple remote machines at one time. Also useful for Microsoft Systems Management Server Configurations.

3

Desktop Management

HP Intelligent Manageability provides standards-based solutions for managing and controlling desktops, workstations, and notebook PCs in a networked environment. This guide summarizes the capabilities and features of the four key components of desktop management:

- Initial configuration and deployment
- Software updating and management
- Asset tracking and security
- Fault notification and recovery

Support for specific features described in this guide may vary by model or software version.

3.1 Initial Configuration and Deployment

HP and Compaq computers come with a preinstalled system software image. After a very brief software "unbundling" process, the computer is ready to be used.

You may prefer to replace the preinstalled software image with a customized set of system and application software. There are several methods for deploying a customized software image. They include:

- Installing additional software applications after unbundling the preinstalled software image.
- Using software deployment tools, such as Microsoft MS Batch or NT Distribution Share (NTDS), or Altiris eXpress to replace the preinstalled software with a customized software image.
- Using a disk cloning process to copy the contents from one hard drive to another.

The best deployment method depends on your information technology environment and processes. The PC Deployment section of the Solutions and Services Web site (www.compaq.com/solutions/pcsolutions) provides information to help you select the best deployment method. You'll also find guides and utilities to integrate Microsoft or PXE-based deployment tools.

The *Restore* CD, ROM-based setup, and ACPI-ready hardware provide further assistance with recovery of system software, configuration management and troubleshooting, and power management.

3.2 Remote System Installation

Remote System Installation lets you start and set up your system using the software and configuration information located on a network server. This feature is usually used as a system setup and configuration tool, and can be used for the following tasks:

- Deploying a software image on one or more new PCs.
- Formatting a hard drive.
- Installing application software or drivers.
- Updating the operating system, application software, or drivers.

To initiate Remote System Installation, press F12 when the F12=Network Service Boot message appears in the lower-right corner of the Compaq logo screen. Follow the instructions on the screen to continue the process.

3.3 Software Updating and Management

HP provides several tools for managing and updating software on desktops and workstations—Altiris eXpress, Altiris PC Transplant Pro, PC Transplant for Compaq, HP Insight Manager™ LC, System Software Manager, and Remote Management Setup Utilities. Using HP Insight Manager LC, you can also monitor a workgroup of PCs from a central console and remotely update the system software, security settings, flash ROM, or hardware device drivers, for each of the managed PCs individually.

3.3.1 Altiris eXpress

Altiris eXpress allows the system administrator to create and quickly deploy a customized, corporate-standard software image across one or more networked client PCs with an interface as simple to use as Windows Explorer. Altiris eXpress supports Intel's Wired for Management and Preboot Execution Environment (PXE). Using Altiris eXpress and the Remote System Installation features of the Compaq computer, there is no need for the system administrator to visit each new PC individually to deploy the software image.

Altiris eXpress is able to install a disk image containing the operating system, application software, and the Altiris eXpress client, without requiring the use of a separate boot diskette. With Altiris eXpress, the network administrator can:

- Create a new image or edit an existing image, or clone a PC on the network which may have the ideal image.
- Create any number of customized disk images for a variety of workgroups.
- Edit image files, modifying them without having to start from scratch. This is possible because Altiris eXpress stores files in its native format: NTFS, FAT16, or FAT32.
- Establish a "New PC Event," a script that will run automatically when a new PC is added to the network. The script can, for instance, format the PC hard drive, flash the ROM BIOS, and install a full, standard software image.
- Schedule an event to run on a group of computers.

Altiris eXpress also includes easy-to-use software distribution capabilities. You can use Altiris eXpress to update operating systems and application software from a central console. When used in conjunction with System Software Manager, Altiris eXpress can also update ROM BIOS and device driver software.

For more information, refer to the Compaq Web site at www.compaq.com/easydeploy.

3.3.2 PC Transplant Pro and PC Transplant for Compaq

PC Transplant is designed to assist you in personalizing your new Compaq computer. It can be downloaded free from the Compaq Web site. It lets you preserve the “personality” or the customized settings, such as Start menu entries, drive and printer mappings, software application options, and so on of an existing PC. It will then transfer those unique settings to a Compaq PC.

For more information, refer to the Compaq Web site at www.compaq.com/easydeploy.

3.3.3 Compaq Insight Manager LC

Compaq Insight Manager LC is a web-based tool for managing workgroups of PCs. It provides a unified “browser-based roaming console,” not only for Compaq clients but any standard DMI 2.0–based PC on the network. It can automatically discover, view system information, and receive alerts from any DMI 2.0 PC on a specified domain or workgroup.

For more information, refer to the Compaq Web site at www.compaq.com/im/lc.

3.3.4 System Software Manager

System Software Manager (SSM) is a utility that lets you update system-level software on multiple systems simultaneously. When executed on a PC client system, SSM detects both hardware and software versions, then updates the appropriate software from a central repository, also known as a file store. Support software that works with SSM is flagged with the PC Lifecycle Management icon on the Compaq Web site. To download the utility or to obtain more information on SSM, visit the Compaq Web site at www.compaq.com/im.

3.3.5 Compaq Remote Management Setup Utilities

The Compaq Remote Management Setup Utilities, when integrated with Management Solutions Partners products supplement the capabilities of Solutions Partners products for distributing new applications, device drivers, and other system software. The Compaq Web site includes updated ROM images and device drivers which can be distributed to client PCs using these software tools.

For more information, refer to the online *Remote Management Administrators Guide.* The *Remote Management Administrators Guide* is included with the Remote Management Setup Utilities, which are available on the Compaq Web site at www.compaq.com/support/files/index.html. The following sections provide information on using these utilities to accomplish various remote management functions including ROM flash, changing security settings, and wakeup/shutdown.

3.3.6 Remote ROM Flash

Your computer comes with a reprogrammable flash ROM (read only memory). By establishing a setup password in Computer Setup, you can protect the ROM from being unintentionally updated or overwritten. This is important to ensure the operating integrity of the computer. Should you need or want to upgrade your ROM, you may:

- Order an upgraded ROMPaq diskette from HP.
- Download the latest ROMPaq images from the HP Web site (www.hp.com).

CAUTION: For maximum ROM protection, be sure to establish a setup password. The setup password prevents unauthorized ROM upgrades. Compaq Insight Manager LC allows the system administrator to set the setup password on one or more PCs simultaneously. For more information, visit the HP Web site at www.hp.com.

Using Remote ROM Flash

Remote ROM Flash allows the system administrator to safely upgrade the ROM on remote HP computers directly from the centralized network management console. Enabling the system administrator to perform this task remotely, on multiple computers and personal computers, results in a consistent deployment of and greater control over HP PC ROM images over the network.

All ROMPaq ROM images from HP are digitally signed to ensure authenticity and minimize potential corruption. Your system ROM may include a Boot Block that is protected during the flash process and allows the computer to be restarted, in the unlikely event of an unsuccessful ROM flash.

Your computer must be powered on, or turned on through Remote Wakeup, to take advantage of Remote ROM Flash. Use of Remote ROM Flash also requires an established setup password.

For more information on enabling Remote ROM Flash, refer to the online *Remote Management Administrators Guide.* The *Remote Management Administrators Guide* is included with the Remote Management Setup Utilities, and is available on the HP web site at www.hp.com.

FailSafe Boot Block ROM

The FailSafe Boot Block ROM allows for system recovery in the unlikely event of a ROM flash failure, for example, if a power failure were to occur during a ROM upgrade. The Boot Block is a flash-protected section of the ROM that checks for a valid system ROM flash when power to the system is turned on.

- If the system ROM is valid, the system starts normally.
- If the system ROM fails the validation check, the FailSafe Boot Block ROM provides enough support to start the system from a ROMPaq diskette, which will program the system ROM with a valid image.

When the Boot Block detects an invalid system ROM, the system sounds a series of beeps (one long and three short) and flashes the three keyboard lights (on and off two times). A Boot Block recovery mode message is displayed on the screen.

To recover the system after it enters Boot Block recovery mode, complete the following steps:

1. Remove any diskettes from the diskette drive and turn off the power.
2. Insert a ROMPaq diskette into the diskette drive.
3. Turn on power to the system.
4. If no ROMPaq diskette is found, you will be prompted to insert one and restart the computer.
5. If a setup password has been established, the Caps Lock light will turn on and you will be prompted to enter the password.
6. Enter the setup password.
7. If the system successfully starts from the diskette and successfully reprograms the ROM, then the three keyboard lights will turn on. A “rising tone” series of beeps also signals successful completion.

The following table lists the various keyboard light combinations used by the Boot Block ROM, as well as the meaning and action associated with each combination.

Keyboard Light Combinations Used by Boot Block ROM

Failsafe Boot Block Mode	Keyboard LED Color	Keyboard LED Activity	State/Message
Num Lock	Green	On	ROMPaq diskette not present, is bad, or drive not ready.*
Caps Lock	Green	On	Enter password.*
Num, Caps, Scroll Lock	Green	Turn on and off 2 times (accompanied by 1 long and 3 short beeps)	ROM flash failed.*
Num, Caps, Scroll Lock	Green	On	Boot Block ROM Flash successful. Turn power off, then on to reboot.

Diagnostic lights do not flash on USB keyboards.

*Insert valid ROMPaq diskette in drive A. Turn power switch off, then on to reflash ROM. If ROM flash is successful, all three keyboard LEDs will light up, and you will hear a rising tone series of beeps. Remove diskette and turn power off, then on to restart the computer.

3.3.7 Remote Security Management

Remote Security Management allows the system administrator to safely set or modify security features on remote HP computers directly from the centralized network management console. Enabling the system administrator to perform these tasks remotely, on multiple computers, results in consistent deployment of and greater control over client computer security parameters over the network.

Your computer must be powered on, or turned on through Remote Wakeup, to take advantage of Remote Security Management. Use of Remote Security Management also requires an established setup password.

For more information about the Remote Management Setup software and enabling Remote Security Management, refer to the online *Remote Management Administrators Guide*. The *Remote Management Administrators Guide* is included with the Remote Management Setup Utilities, and is available on the HP web site at www.hp.com.

3.3.8 Remote Wakeup and Remote Shutdown

If your computer has an optional network card installed, it may support the Remote Wakeup and Remote Shutdown functions. These functions allow a system administrator to power on and power off a client computer from a remote location supported by PC LAN management tools.

Third-party software tools are required to remotely distribute software.

Remote Wakeup allows the network interface controller to continue functioning when power to the computer has been turned off, but the power cord is still connected to an electrical outlet.

The computer continues to consume a small amount of electricity even after you turn it off. Only when you disconnect the power cord from the electrical outlet does the computer stop consuming electricity.

To enable Remote Wakeup and Remote Shutdown, complete the following steps:

1. Double-click the *Network Icon*, located in the Control Panel.
2. Double-click the appropriate network controller.
3. Click the Advanced Properties tab.
4. Select Remote Wakeup.
5. Change the value to ON.
6. Click OK to save and apply changes, then click OK to exit the Network dialog.

For more information on using Remote Wakeup and Remote Shutdown, refer to the online *Remote Management Administrators Guide.* The *Remote Management Administrators Guide* is included with the Remote Management Setup Utilities, and is available on the HP web site at www.hp.com.

3.3.9 NIC Alert

The NIC Alert function enables desktop PCs to send an immediate alert to the network administrator when there is a hardware or operating system failure, or evidence of tampering. An alert will be sent even if the system is powered off or the operating system has not yet started.

3.3.10 Replicating Your Setup

This procedure gives an administrator the ability to easily copy one setup configuration to other computers of the same model. This allows for faster, more consistent configuration of multiple computers. To replicate your setup:

1. Access the Computer Setup Utilities menu.
2. Click File > Save to Diskette. Follow the instructions on the screen.

This requires an internal diskette drive, a MultiBay LS-120 drive, or a portable, external diskette drive.

3. To replicate the configuration, click File > Restore from Diskette, and follow the instructions on the screen.

Altiris eXpress and PC Transplant make it easy to replicate the configuration and custom settings of one PC and copy it to one or more PCs. For more information, visit the HP web site at www.hp.com.

3.3.11 Dual-State Power Button

With Advanced Configuration and Power Interface (ACPI) enabled for Windows 98, Windows NT, and Windows 2000, the power button can function either as an on/off switch or as a suspend button. The suspend feature does not completely turn off power, but instead causes the computer to enter a low-power standby. This allows you to quickly power down without closing applications and to quickly return to the same operational state without any data loss.

To change the power button's configuration, complete the following steps:

1. Access the Computer Setup menu.
2. Select Power > Energy Saver. Select Minimal or Advanced to turn on the Energy Saver Options menu.
3. Select Power > Energy Saver Options. Set the power button configuration to either On/Off or Suspend/Wakeup, as desired.
4. Refer to the *Computer Setup Guide* for more detailed information about the features of Computer Setup.
5. Select File > Save Changes and Exit.

After configuring the power button to function as a suspend button, press the power button to put the system in a very low power state (suspend). Press the button again to quickly bring the system out of suspend to full power status. To completely turn off all power to the system, press and hold the power button for four seconds.

If you have selected the "Blink LED during Energy Save" option in Computer Setup, the power-on light will blink green once every two seconds while the computer is in suspend. Refer to the *Computer Setup Guide* for more information on using Computer Setup.

3.3.12 Power Management

Power Management is a feature that saves energy by shutting down certain components of the computer when they are not in use, saving energy without having to shut down the computer. Timeouts (the period of inactivity allowed before shutting down these components) can be enabled, customized, or disabled using Computer Setup.

1. Access the Computer Setup menu.
2. Select Power > Energy Saver. Select Advanced to turn on the Timeouts menu.
3. Select Power > Timeouts. Enable, customize, or disable timeouts.
4. Refer to the *Computer Setup Guide* for more detailed information about the features of Computer Setup.
5. Select File > Save Changes and Exit.

To avoid conflicts, never enable monitor timeouts in Windows 98 while system timeouts are enabled in Computer Setup.

Use Display Properties to establish, modify, or disable Power Management settings for the monitor. To access Display Properties, right-click on the Windows Desktop, then choose Properties.

3.3.13 World Wide Web Site

When making the transition to new or revised operating systems, it is important to implement the support software designed for that operating system. If you plan to run a version of Microsoft Windows or Microsoft Windows NT Workstation that is different from the version included with your computer, you must install corresponding HP device drivers and utilities to ensure that all features are supported and functioning properly.

HP has made the task of locating, accessing, evaluating, and installing the latest support software easier. You can download the software from the HP web site at www.hp.com.

The Web site contains the latest device drivers, utilities, and flashable ROM images needed to run the latest Microsoft Windows operating system on your HP or Compaq computer.

3.3.14 Desktop Management Interface (DMI)

The Desktop Management Task Force (DMTF) is an industry body with the goal of standardizing systems manageability. DMTF established the Desktop Management Interface (DMI) framework to standardize access to PC configuration data. HP delivers hardware and software instrumentation that supports the DMI standard.

For more information on configuring the DMI software, refer to the online *Intelligent Manageability Guide.*

3.3.15 Wired for Management

Intel's Wired for Management initiative is focused on reducing the support and administration cost of Intel architecture–based systems without compromising flexibility and performance. The Wired for Management guidelines provide a baseline set of building blocks that HP utilizes in Intelligent Manageability to provide standardized management of desktop inventories, remote system configuration, off-hours maintenance, and next generation power management. Additional capabilities have been incorporated into Intelligent Manageability to provide an extensive solution for managing networked computing environments.

Wired for Management technologies include:

- Desktop Management Interface (DMI) 2.0
- Remote System Installation
- Remote Wakeup and Remote Shutdown
- ACPI-Ready Hardware
- SMBIOS
- Pre-boot Execution (PXE) support
- Boot Integrity Services (BIS)

3.4 Asset Tracking and Security

Compaq AssetControl features incorporated into the computer provide key asset tracking data that can be managed using HP Insight Manager products and Management Solutions Partners products. Seamless, automatic integration between AssetControl features and these products enables you to choose the management tool that is best suited to your environment and to leverage your investment in existing tools.

Compaq Deskpro Workstations, Evo Desktops, and Evo Workstations are manufactured with the hardware and firmware required to fully support the DMI 2.0 standard.

HP also offers several solutions for controlling access to valuable components and information. Security features such as the Smart Cover Sensor and the Smart Cover Lock, available on select models, help to prevent unauthorized access to the internal components of the personal computer. By disabling parallel, serial, or USB ports, or by disabling removable media boot capability, you can protect valuable data assets. Memory Change and Smart Cover Sensor alerts can be automatically forwarded to HP Insight Manager products to deliver proactive notification of tampering with a computer’s internal components.

There are three ways to manage security settings on your computers:

- Locally, using the Computer Setup Utilities. See the *Computer Setup Guide* included with the computer for additional information and instructions on using the Computer Setup Utilities.
- Remotely, using the Remote Security Management software. This software enables the secure, consistent deployment and control of security settings from a central point on the network using a third-party PC LAN management application such as Microsoft SMS.
- Remotely, using HP Insight Manager LC, a tool for managing PC workgroups.

The following table and sections refer to managing security features of your computer locally through the Setup Utilities. Refer to the Remote Management Setup Utilities for more information on using the Remote Security Management software. These utilities are available on the HP web site at www.hp.com/support/files/index.html. For more information on HP Insight Manager LC, refer to www.compaq.com/im/lc.

Security Features Overview

Feature	Purpose	How It Is Established
Removable Media Boot Control	Prevents booting from the removable media drives.	From the Compaq Computer Setup Utilities menu.
Serial, Parallel, USB, or Infrared Interface Control	Prevents transfer of data through the integrated serial, parallel, USB (universal serial bus), or infrared interface.	From the Compaq Computer Setup Utilities menu.
Power-On Password	Prevents use of the computer until the password is entered. This can apply to both initial system startup and restarts.	From the Compaq Computer Setup Utilities menu.
Setup Password	Prevents reconfiguration of the computer (use of the Computer Setup Utilities) until the password is entered.	From the Compaq Computer Setup Utilities menu.
Network Server Mode	Provides unique security features for computers being used as servers.	From the Compaq Computer Setup Utilities menu.
DriveLock	Prevents unauthorized access to the data on specific hard drives. This feature is available on select models only.	From the Compaq Computer Setup Utilities menu.
Smart Cover Sensor	Indicates that computer cover or side panel has been removed. Can be set to require the setup password to restart the computer, after the cover or side panel has been removed.	From the Compaq Computer Setup Utilities menu.

Security Features Overview *(Continued)*

Feature	Purpose	How It Is Established
Master Boot Record Security	May prevent unintentional or malicious changes to the Master Boot Record of the current bootable disk, and provides a means of recovering the "last known good" MBR.	From the Compaq Computer Setup Utilities menu.
Memory Change Alerts	Detects when memory modules have been added, moved, or removed; notifies user and system administrator.	For information on enabling Memory Change Alerts, refer to the online *Intelligent Manageability Guide*.
Ownership Tag	Displays ownership information, as defined by the system administrator, during system startup (protected by setup password).	From the Compaq Computer Setup Utilities menu.
Kensington Cable Lock Provision	Inhibits access to the interior of the computer to prevent unwanted configuration changes or component removal. Can also be used to secure the computer to a fixed object to prevent theft.	Install a Kensington cable lock to secure the computer to a fixed object.

For more information about Computer Setup, see the *Computer Setup Guide*.

3.4.1 Password Security

The power-on password prevents unauthorized use of the computer by requiring entry of a password to access applications or data each time the computer is turned on or restarted. The setup password specifically prevents unauthorized access to Computer Setup, and can also be used as an override to the power-on password. That is, when prompted for the power-on password, entering the setup password instead will allow access to the computer.

A network-wide setup password can be established to enable the system administrator to log in to all network systems to perform maintenance without having to know the power-on password, even if one has been established.

Establishing a Setup Password Using Computer Setup

Establishing a setup password through Computer Setup prevents reconfiguration of the computer (use of the Computer Setup utility) until the password is entered.

1. Turn on or restart the computer. If you are in Windows, click Start > Shut Down > Restart the computer.
2. When the F10 Setup message appears in the lower-right corner of the screen, press the F10 key. Press Enter to bypass the title screen, if necessary.

If you do not press the F10 key while the message is displayed, you must restart the computer to access the utility.

3. Select Security, then select Setup Password and follow the instructions on the screen.
4. Before exiting, click File > Save Changes and Exit.

Establishing a Power-On Password Using Computer Setup

Establishing a power-on password through Computer Setup prevents access to the computer when power is turned on, unless the password is entered. When a power-on password is set, Computer Setup presents Password Options under the Security menu. The password options include Network Server Mode and Password Prompt on Warm Boot.

When Network Server Mode is disabled, the password must be entered each time the computer is turned on when the key icon appears on the monitor. When Password Prompt on Warm Boot is enabled, the password must also be entered each time the computer is rebooted. When Network Server Mode is enabled, the password prompt is not presented during POST, but any attached PS/2 keyboard will remain locked until the user enters the power-on password.

1. Turn on or restart the computer. If you are in Windows, click Start > Shut Down > Restart the Computer.
2. When the F10 Setup message appears in the lower-right corner of the screen, press the F10 key. Press Enter to bypass the title screen, if necessary.

If you do not press the F10 key while the message is displayed, you must restart the computer to access the utility.

3. Select Security, then Power-On Password and follow the instructions on the screen.
4. Before exiting, click File > Save Changes and Exit.

Entering a Power-On Password

To enter a power-on password, complete the following steps:

1. Turn on or restart the computer. If you are in Windows, click Start > Shut Down > Restart the Computer.
2. When the key icon appears on the monitor, type your current password, then press Enter.

Type carefully; for security reasons, the characters you type do not appear on the screen.

If you enter the password incorrectly, a broken key icon appears. Try again. After three unsuccessful tries, you must turn off the computer, then turn it on again before you can continue.

Entering a Setup Password

If a setup password has been established on the computer, you will be prompted to enter it each time you run Computer Setup.

1. Turn on or restart the computer. If you are in Windows, click Start > Shut Down > Restart the computer.
2. When the F10=Setup message appears in the lower-right corner of the screen, press the F10 key.

If you do not press the F10 key while the message is displayed, you must restart the computer to access the utility.

3. When the key icon appears on the monitor, type the setup password, then press the Enter key.

Type carefully; for security reasons, the characters you type do not appear on the screen.

If you enter the password incorrectly, a broken key icon appears. Try again. After three unsuccessful tries, you must turn off the computer, then turn it on again before you can continue.

Changing a Power-On or Setup Password

1. Turn on or restart the computer. If you are in Windows, click Start > Shut Down > Restart the Computer. To change the setup password, run Computer Setup.
2. When the key icon appears, type your current password, a slash (/) or alternate delimiter character, your new password, another slash (/) or alternate delimiter character, and your new password again as shown:
   current password/new password/new password

Type carefully; for security reasons, the characters you type do not appear on the screen.

3. Press the Enter key. The new password takes effect the next time you turn on the computer.

Refer to the “National Keyboard Delimiter Characters” section in this chapter for information about the alternate delimiter characters.

The power-on password and setup password may also be changed using the Security options in Computer Setup.

3.4.2 Deleting a Power-On or Setup Password

1. Turn on or restart the computer. If you are in Windows, click Start > Shut Down > Restart the Computer. To delete the setup password, run Computer Setup.
2. When the key icon appears, type your current password followed by a slash (/) or alternate delimiter character as shown:

   current password/

3. Press the Enter key.

Refer to "National Keyboard Delimiter Characters" table for information about the alternate delimiter characters. The power-on password and setup password may also be changed using the Security options in Computer Setup.

National Keyboard Delimiter Characters

Each keyboard is designed to meet country-specific requirements. The syntax and keys that you use for changing or deleting your password depend on the keyboard that came with your computer.

National Keyboard Delimiter Characters

Arabic	/	Greek	-	Russian	/
Belgian	=	Hebrew	.	Slovakian	-
BHCSY*	-	Hungarian	-	Spanish	-
Brazilian	/	Italian	-	Swedish/Finnish	/
Chinese	/	Japanese	/	Swiss	-
Czech	-	Korean	/	Taiwanese	/
Danish	-	Latin American	-	Thai	/
French	!	Norwegian	-	Turkish	.
French Canadian	é	Polish	-	U.K. English	/
German	-	Portuguese	-	U.S. English	/

* For Bosnia-Herzegovina, Croatia, Slovenia, and Yugoslavia

Clearing Passwords

If you forget your password, you cannot access the computer. Refer to the *Troubleshooting Guide* for instructions on clearing passwords.

3.4.3 Network Server Mode

Network Server Mode provides unique security features for computers being used as servers. It is only available when a power-on password has been set in Computer Setup. When the Network Server Mode is enabled, the power-on password is not required to boot the hard drive, and a keyboard is not required to be attached to the system. If a PS/2 keyboard is present, it will be locked until the user enters the power-on password. If a USB keyboard is present, it will remain usable by default. To prevent USB keyboard access after the operating system has loaded, a user must hide the USB Port under the Device Security option of Computer Setup's Security menu. When used in conjunction with the Computer Setup After Power Loss power-on option, Network Server Mode permits the "server" to automatically reboot after a power interruption without user intervention. While Network Server Mode is enabled, the power-on password must be entered to boot the removable media (e.g. diskettes) or removable devices (e.g. USB flash devices).

3.4.4 DriveLock

DriveLock is a security feature that prevents unauthorized access to the data on specific hard drives. DriveLock has been implemented as an extension to Computer Setup. It is only available on certain systems and only when DriveLock-capable hard drives are detected.

DriveLock employs a two-password security scheme. One password is intended to be set and used by a system administrator while the other is typically set and used by the end-user. There is no "back-door" that can be used to unlock the drive if both passwords are forgotten. Therefore, DriveLock is most safely used when the data contained on the hard drive is replicated on a corporate information system or is regularly backed-up.

In the event that both DriveLock passwords are lost, the hard drive is rendered unusable.

Using DriveLock

The DriveLock option appears under the Security menu in Computer Setup. The user is presented with options to set the master password or to enable DriveLock. A user password must be provided in order to enable DriveLock. Since the initial configuration of DriveLock is typically performed by a system administrator, a master password should be set first. HP encourages system administrators to set a master password whether they plan to enable DriveLock or keep it disabled. This will give the administrator the ability to modify DriveLock settings if the drive is locked in the future. Once the master password is set, the system administrator may enable DriveLock or choose to keep it disabled.

If a locked hard drive is present, POST will require a password to unlock the device. If a power-on password is set and it matches the device's user password, POST will not prompt the user to re-enter the password. Otherwise, the user will be prompted to enter a DriveLock password. Either the master or the user password may be used. Users will have two attempts to enter a correct password. If neither attempt succeeds, POST will continue but the data on the drive will remain inaccessible.

DriveLock Applications

The most practical use of the DriveLock security feature is in a corporate environment where a system administrator provides users with multibay hard drives for use in some desktop computers. The system administrator would be responsible for configuring the multibay hard drive which would involve, among other things, setting the DriveLock master password. In the event that the user forgets the user password or the equipment is passed on to another employee, the master password can always be used to reset the user password and regain access to the hard drive.

HP recommends that corporate system administrators who choose to enable DriveLock also establish a corporate policy for setting and maintaining master passwords. This should be done to prevent a situation where an employee intentionally or unintentionally sets both DriveLock passwords before leaving the company. In such a scenario, the hard drive would be rendered unusable and require replacement. Likewise, by not setting a master password, system administrators may find themselves locked out of a hard drive and unable to perform routine checks for unauthorized software, other asset control functions and support.

For users with less stringent security requirements, HP does not recommend enabling DriveLock. Users in this category include personal users or users who do not maintain sensitive data on their hard drives as a common practice. For these users, the potential loss of a hard drive resulting from forgetting both passwords is much greater than the value of the data DriveLock has been designed to protect. Access to Computer Setup and DriveLock can be restricted through the Setup password. By specifying a Setup password and not giving it to end users, system administrators are able to restrict users from enabling DriveLock.

3.4.5 Smart Cover Sensor

Smart Cover Sensor, available on select models, is a combination of hardware and software technology that can alert you when the computer cover or side panel has been removed. There are three levels of protection, as described in the following table.

Smart Cover Sensor Protection Levels

Level	Setting	Description
Level 0	Smart Cover = Disabled	Smart Cover Sensor is disabled (default).
Level 1	Smart Cover = Notify User	When the computer is restarted, the screen displays a message indicating that the computer cover or side panel has been removed.
Level 2	Setup Password = enabled and Smart Cover = notify user	When the computer is restarted, the screen displays a message indicating that the computer cover or side panel has been removed. You must enter the setup password to continue.

Setting the Smart Cover Sensor Protection Level

To set the Smart Cover Sensor protection level, complete the following steps:

1. Turn on or restart the computer. If you are in Windows, click Start > Shut Down > Restart the Computer.
2. When the F10 Setup message appears in the lower-right corner of the screen, press the F10 key. Press Enter to bypass the title screen, if necessary.

If you do not press the F10 key while the message is displayed, you must restart the computer to access the utility.

3. Select Security, then Smart Cover, and follow the instructions on the screen.
4. Before exiting, click File > Save Changes and Exit.

3.4.6 Smart Cover Lock

The Smart Cover Lock is a software-controllable cover lock featured on select Compaq PCs. This lock prevents unauthorized access to the internal components. Computers ship with the Smart Cover Lock in the unlocked position.

CAUTION: For maximum cover lock security, be sure to establish a setup password. The setup password prevents unauthorized access to the Computer Setup utility.

Locking the Smart Cover Lock

To activate and lock the Smart Cover Lock, complete the following steps:

1. Turn on or restart the computer. If you are in Windows, click Start > Shut Down > Restart the Computer.
2. When the F10 Setup message appears in the lower-right corner of the screen, press the F10 key. Press Enter to bypass the title screen, if necessary.

If you do not press the F10 key while the message is displayed, you must restart the computer to access the utility.

3. Select Security, then select Smart Cover and the Locked option.
4. Before exiting, click File > Save Changes and Exit.

Unlocking the Smart Cover Lock

1. Turn on or restart the computer. If you are in Windows, click Start > Shut Down > Restart the Computer.
2. When the F10 Setup message appears in the lower-right corner of the screen, press the F10 key. Press Enter to bypass the title screen, if necessary.

If you do not press the F10 key while the message is displayed, you must restart the computer to access the utility.

3. Select Security > Smart Cover > Unlocked.
4. Before exiting, click File > Save Changes and Exit.

Using the Smart Cover FailSafe Key

If you enable the Smart Cover Lock and cannot enter your password to disable the lock, you will need a Smart Cover FailSafe Key to open the computer cover. You will need the key in any of the following circumstances:

- Power outage
- Startup failure
- PC component failure (such as processor or power supply)
- Forgotten password

CAUTION: The Smart Cover FailSafe Key is a specialized tool available from Compaq. Be prepared; order this key before you need one.

To obtain the FailSafe Key, do any one of the following:

- Contact your authorized Compaq reseller or service provider.
- Refer to the HP web site (www.hp.com) for ordering information.
- Call the appropriate number listed in the warranty.

For more information about using the Smart Cover FailSafe Key, refer to Section 6.4.2 in this manual.

3.4.7 Master Boot Record Security

The Master Boot Record (MBR) contains information needed to successfully boot from a disk and to access the data stored on the disk. Master Boot Record Security may prevent unintentional or malicious changes to the MBR, such as those caused by some computer viruses or by the incorrect use of certain disk utilities. It also allows you to recover the "last known good" MBR, should changes to the MBR be detected when the system is restarted.

To enable MBR Security, complete the following steps:

1. Turn on or restart the computer. If you are in Windows, click Start > Shut Down > Restart the Computer.
2. When the F10 Setup message appears in the lower-right corner of the screen, press the F10 key. Press Enter to bypass the title screen, if necessary.

If you do not press the F10 key while the message is displayed, you must restart the computer to access the utility.

3. Select Security > Master Boot Record Security > Enabled.
4. Select Security > Save Master Boot Record.
5. Before exiting, click File > Save Changes and Exit.

When MBR Security is enabled, the BIOS prevents any changes being made to the MBR of the current bootable disk while in MS-DOS or Windows Safe Mode.

Most operating systems control access to the MBR of the current bootable disk; the BIOS cannot prevent changes that may occur while the operating system is running.

Each time the computer is turned on or restarted, the BIOS compares the MBR of the current bootable disk to the previously saved MBR. If changes are detected and if the current bootable disk is the same disk from which the MBR was previously saved, the following message is displayed:

1999 - Master Boot Record has changed.

Press any key to enter Setup to configure MBR Security.

Upon entering Computer Setup, you must

- Save the MBR of the current bootable disk;
- Restore the previously saved MBR; or
- Disable the MBR Security feature.

You must know the setup password, if one exists.

If changes are detected and if the current bootable disk is **not** the same disk from which the MBR was previously saved, the following message is displayed:

2000 - Master Boot Record Hard Drive has changed.

Press any key to enter Setup to configure MBR Security.

Upon entering Computer Setup, you must

- Save the MBR of the current bootable disk; or
- Disable the MBR Security feature.

You must know the setup password, if one exists.

In the unlikely event that the previously saved MBR has been corrupted, the following message is displayed:

1998 - Master Boot Record has been lost.

Press any key to enter Setup to configure MBR Security.

Upon entering Computer Setup, you must

- Save the MBR of the current bootable disk; or
- Disable the MBR Security feature.

You must know the setup password, if one exists.

Before You Partition or Format the Current Bootable Disk

Ensure that MBR Security is disabled before you change partitioning or formatting of the current bootable disk. Some disk utilities, such as FDISK and FORMAT, attempt to update the MBR. If MBR Security is enabled when you change partitioning or formatting of the disk, you may receive error messages from the disk utility or a warning from MBR Security the next time the computer is turned on or restarted. To disable MBR Security, complete the following steps:

1. Turn on or restart the computer. If you are in Windows, click Start > Shut Down > Restart the Computer.
2. When the F10 Setup message appears in the lower-right corner of the screen, press the F10 key. Press Enter to bypass the title screen, if necessary.

If you do not press the F10 key while the message is displayed, you must restart the computer to access the utility.

3. Select Security > Master Boot Record Security > Disabled.
4. Before exiting, click File > Save Changes and Exit.

3.4.8 Kensington Cable Lock Provision

The rear panel of the computer accommodates a cable lock so that the computer can be physically secured to a work area.

For illustrated instructions, please see the *Hardware Reference Guide* on the *Reference Library* CD.

3.4.9 Fingerprint Identification Technology

Eliminating the need to enter user passwords, Compaq Fingerprint Identification Technology tightens network security, simplifies the login process, and reduces the costs associated with managing corporate networks.

Support for Fingerprint Identification Technology varies by model.

See www.compaq.com/products/options/fit/index.html for more information.

3.5 Fault Notification and Recovery

Fault Notification and Recovery features combine innovative hardware and software technology to prevent the loss of critical data and minimize unplanned downtime.

When a fault occurs, the computer displays a Local Alert message containing a description of the fault and any recommended actions. You can then view current system health by using the Compaq Management Agent. If the computer is connected to a network managed by a Compaq Insight Manager product or other management products from Compaq Management Solutions Partners, the computer also sends a fault notice to the network management application.

3.5.1 Drive Protection System

The Compaq Drive Protection System (DPS) is a diagnostic tool built into the hard drives installed in select Compaq computers. DPS is designed to help diagnose problems that might result in unwarranted hard drive replacement.

When Compaq enterprise computers are built, each installed hard drive is tested using DPS, and a permanent record of key information is written onto the drive. Each time DPS is run, test results are written to the hard drive. Your service provider can use this information to help diagnose conditions that caused you to run the DPS software. Refer to the *Troubleshooting Guide* for instructions on using DPS.

3.5.2 Ultra ATA Integrity Monitoring

Ultra ATA Integrity Monitoring monitors the integrity of data as it is transferred between an Ultra ATA hard drive and the system's core logic. If the computer detects an abnormal number of transmission errors, the computer displays a Local Alert message with recommended actions.

3.5.3 ECC Fault Prediction and Prefailure Warranty

When the computer encounters an excessive number of error checking and correcting (ECC) memory errors, the computer displays a Local Alert message. This message contains detailed information about the errant memory module, allowing you to take action before you experience non-correctable memory errors. The Prefailure Warranty for ECC memory modules allows you to replace these modules, free of charge, before the modules actually fail. ECC memory modules are optional on all HP personal computers.

To use this feature, you must replace the standard DIMMs or RIMMs with ECC DIMMs or ECC RIMMs.

3.5.4 Surge-Tolerant Power Supply

An integrated surge-tolerant power supply provides greater reliability when the computer is hit with an unpredictable power surge. This power supply is rated to withstand a power surge of up to 2000 volts without incurring any system downtime or data loss.

3.5.5 Thermal Sensor

The thermal sensor is a hardware and software feature that tracks the internal temperature of the computer. This feature displays a warning message when the normal range is exceeded, which gives you time to take action before internal components are damaged or data is lost.

4

Ultra ATA Drive Guidelines and Features

4.1 Ultra ATA Jumpers

Ultra ATA drives are configured by means of jumper settings. Factory-installed drives ship with the jumpers preset to the cable-select mode; therefore, no jumper setting changes are required on factory preinstalled, replacement, or option drives. With cable-select, the drive is configured as either Master (Drive/Device 0) or Slave (Drive/Device 1) by its physical attachment to the cable.

If you purchase a third-party hard drive, refer to the documentation included with the drive kit to ensure proper cable installation and configuration.

All drives on a controller channel need to have their jumpers either in the cable-select mode or have the individual drive jumper installed on the appropriate Master (Drive/Device 0) or Slave (Drive/Device 1) position.

4.2 Ultra ATA Cables

When installing a second device on either the primary or secondary controller, you must use an industry standard 80-conductor Ultra ATA cable for optimal performance. These cables have a maximum length of 18 inches and a maximum distance of 6 inches between the two devices for a two-drive cable.

Drives operating at speeds faster than those of the Ultra ATA-33 devices require industry-standard 40-pin, 80-conductor cables to maintain the higher data transfer rates possible with the improved technology.

When using Ultra ATA-100, -66, and slower -33 drives in the same system, each drive will operate at its appropriate data transfer rate.

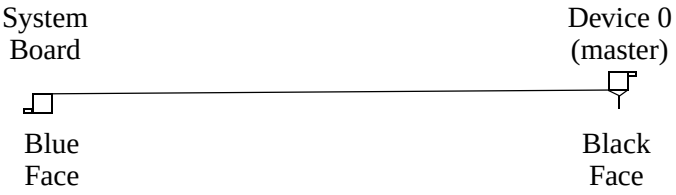
4.2.1 Cable Layout

The faces of industry-standard cable connectors are color coded for easy recognition:

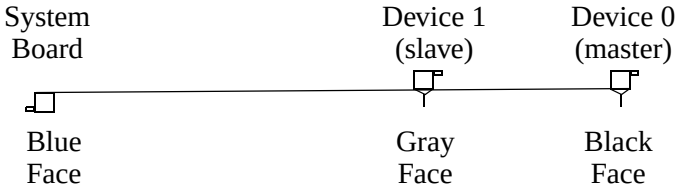
- System board connector = blue face
- Device 0 connector = black face
- Device 1 connector = gray face

The color code of an industry-standard cable is valid only if the drive's jumper is in the cable-select position.

Single-Drive Cable



Two-Drive Cable



On a two-drive cable, the Drive/Device 0 connector is always the farthest one from the system board connector and the Drive/Device 1 connector is always the closest to the system board connector.

Some cables may be labeled “Drive 0” instead of “Device 0” and “Drive 1” instead of “Device 1”.

4.3 Drive Installation Guidelines

Most computer system boards have two ATA (IDE) controller channels with a dedicated connector for each controller. One controller is designated as the primary and the other as the secondary controller.

Each of the two controllers can have up to two devices attached to it. Each computer system may therefore have a maximum of four ATA/ATAPI drives. All drives are connected to these controllers using an industry-standard 80-conductor cable.

The industry standard 1.44 MB diskette drive has its own separate channel and is not included as a part of the maximum four drives.

Any drive attached to a controller must have a drive designation. If only a single drive is connected to a controller and its jumper is in the cable-select position, it is designated as the Master Drive (Drive/Device 0) by its attachment to the Drive/Device 0 cable position. If two cable-selected drives are connected to a single controller, one will be designated by its attachment to the cable as the Master (Drive/Device 0) and the other as Slave (Drive/Device 1).

For optimal performance of a computer system, all drives need to be attached to the ATA controllers in a specified sequence. This sequence is determined by the device class of the drives and by specific attach sequence rules.

4.3.1 Device Classes

In order to determine the best drive attach sequence, ATA/ATAPI drives are segregated into four different classes based upon the bandwidth demands they place on an ATA controller. The most demanding devices are in Class 1 and the least demanding are in Class 4.

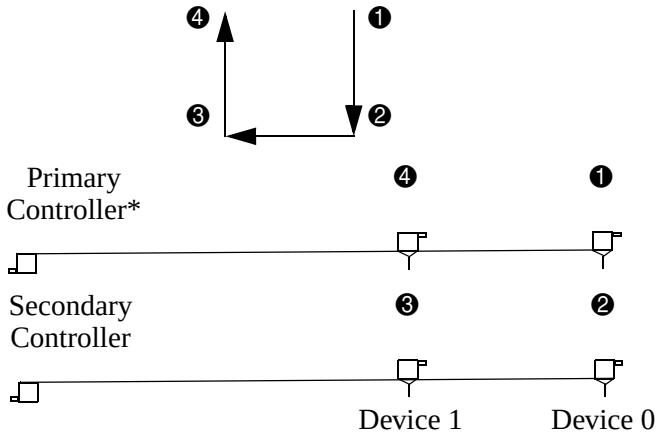
Class 1 Hard Drives	Class 2 High Speed Optical Drives	Class 3 Optical Storage Drives	Class 4 Magnetic Storage Drives
ATA-100	DVD	R/W CD-ROM	LS-120
ATA-66	DVD-CD R/W	CD-ROM	Tape
ATA-33			Zip

General Attach Guidelines

- The lower the device class number, the faster the device and the more bandwidth required.
- Drives installed in the Device 0 positions on both the primary and secondary controllers receive the greatest possible bandwidth.
- The bootable ATA hard drive should always be installed on the primary controller in the Device 0 position.

4.3.2 Attach Sequence Rules by Class Priority

Drives should be attached in the sequence shown for optimum performance starting at position ❶.



*If there are three or more devices, two or more of which are hard drives, two hard drives should be attached to the primary controller first before following the General Attach Sequence Rule.

The attach sequence rule may also be stated in table format:

General Attach Sequence Rule*

Sequence	Description
1	The lowest class drive - bootable hard drive recommended.
2	If only two drives, the last drive goes here; otherwise the lowest class of the remaining drives.
3	If only three drives, attach the final drive here. If a fourth drive exists, attach the lowest class drive here.
4	If there is a fourth drive, attach the final drive here - the drive with the highest class number of all devices.

*If there are three or more devices, two or more of which are hard drives, two hard drives should be attached to the primary controller first before following the General Attach Sequence Rule.

The rules allow for:

- Keeping the hard drive on a separate controller channel maximizes drive performance until a fourth device is added.
- Keeping the hard drives and removable media drives on separate controller channels maximizes compatibility.
- Keeping the hard drive and the writable optical drive on separate controller channels maximizes optical drive reliability.

4.3.3 Attach Sequence Worksheet

Use the worksheet below for obtaining optimum system performance when setting up a computer with multiple drives. Use the General Attach Sequence Rule to determine the best drive installation sequence.

Attach Sequence Worksheet

Device Name	Device Class	Position Number	Controller Name	Device Number

Two examples of how to use the worksheet are:

- Three device installation
- Four device installation

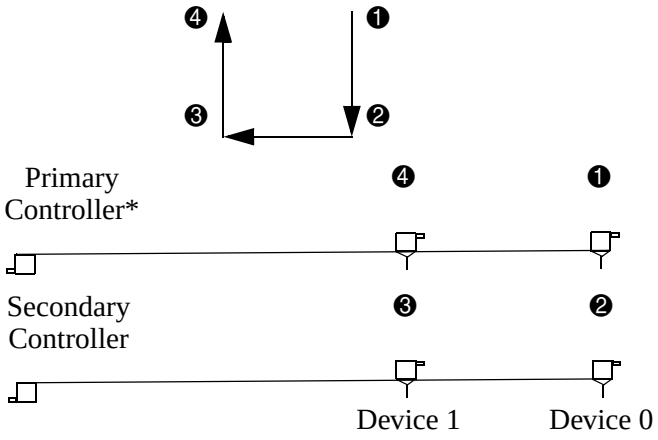
Example 1: Three Device Installation Sample

A system has three devices: Ultra ATA-100 hard drive, CD-ROM drive, and a DVD drive. Using the Device Class Table in Section 4.3.1, the devices may be identified as:

- Ultra ATA-100 hard drive = Class 1
- DVD drive = Class 2
- CD-ROM drive = Class 3

Attach Sequence Worksheet - Three Device Installation (Sample)

Device Name	Device Class	Position Number	Controller Name	Device Number
Ultra ATA-100 hard drive	1	❶	Primary	0
DVD drive	2	❷	Secondary	0
CD-ROM drive	3	❸	Secondary	1



Example 2: Four Device Installation Sample

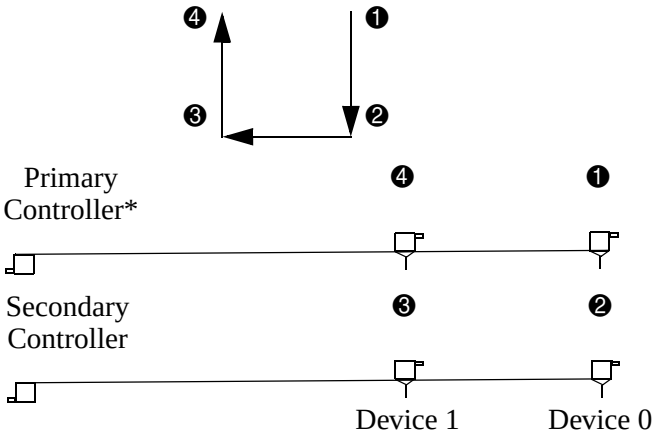
A system has four devices: Ultra ATA-100 hard drive, Ultra ATA-100 hard drive, DVD-CDR/W drive, and a ZIP-250 drive. Using the Device Class Table in Section 4.3.1, the devices may be reidentified as:

- Ultra ATA-100 hard drive = Class 1
- Ultra ATA-100 hard drive = Class 1
- DVD-CDR/W drive = Class 2
- ZIP-250 drive = Class 4

Attach Sequence Worksheet - Four Device Installation (Sample)

Device Name	Device Class	Position Number	Controller Name	Device Number
Ultra ATA-100 hard drive	1	❶	Primary	0
DVD-CDR/W drive	2	❷	Secondary	0
ZIP-250 drive	4	❸	Secondary	1
Ultra ATA-100 hard drive*	1	❹	Primary	1

*If there are three or more devices, two or more of which are hard drives, two hard drives should be attached to the primary controller first before following the General Attach Sequence Rule.



4.3.4 Additional Drive Application Notes

- When replacing a hard drive, the replacement should be of the same type (Ultra ATA -33, -66, or -100) as that being removed to retain the same level of performance.
- When Ultra ATA and SCSI hard drives are mixed in the same system, the Ultra ATA drive will become the boot drive unless the boot order is changed in Computer Setup (F10 Setup).

4.4 SMART

The Self Monitoring Analysis and Recording Technology (SMART) ATA drives for the HP and Compaq Personal Computers and Workstations have built-in drive failure prediction that warns the user or the network administrator of an impending failure or crash of the hard drive. The SMART drives track fault prediction and failure indication parameters such as reallocated sector count, spin retry count, and calibration retry count. If the drive determines that a failure is imminent, it generates a fault alert.

4.5 Drive Capacities

The combination of the file system and the operating system used in the computer determines the maximum usable size of a drive partition. A drive partition is the largest segment of a drive that may be properly accessed by the operating system. A single hard drive may therefore be subdivided into a number of unique drive partitions in order to make use of all of its space.

The table that follows identifies the capabilities and restrictions imposed on the computer by the combinations of file and operating systems.

Microsoft to Drive Manufacturer Size Conversion Table*

Drive Size as Identified by Microsoft Operating System	Drive Size as Identified by Drive Manufacturers
2 GB	2.1 GB
4 GB	4.3 GB
32 GB	34.4 GB
64 GB	68.7 GB
128 GB	137 GB
2 TB	2.199 TB

*Drive size calculations by drive manufacturers are bytes to the base 10 while calculations by Microsoft are bytes to the base 2.

Drive/Partition Capacity Limits

File System	Controller Type	Operating System	Maximum Size	
			Partition	Drive
FAT 16	ATA or SCSI	DOS/Windows 95	2 GB	128 GB
FAT 16	ATA or SCSI	Windows NT	4 GB	128 GB
FAT 32	ATA or SCSI	Windows 98/SE	64 GB	128 GB
FAT 32	ATA	Windows 98/SE with QFE* and Windows ME	128 GB	128 GB
FAT 32	SCSI	Windows 98/SE with QFE* and Windows ME	2 TB	2 TB
FAT 32	ATA	Windows 2000/ XP	32 GB	128 GB
FAT 32	SCSI	Windows 2000/ XP	32 GB	2 TB
NTFS	ATA	Windows NT/2000/XP	128 GB	128 GB
NTFS	SCSI	Windows NT/2000/XP	2TB	2TB

*For Windows 98/SE with QFE see www.microsoft.com, search for Q263044 for details on how to expand partition size.

5

SCSI Devices

5.1 SCSI Guidelines

When installing and operating SCSI devices, you must follow these guidelines:

- A narrow (50-pin) SCSI controller allows you to daisy-chain up to 7 additional SCSI devices. Counting the controller, that amounts to 8 total SCSI devices.
- A wide (68-pin) SCSI controller allows you to daisy-chain up to 15 additional SCSI devices. Counting the controller, that amounts to 16 total SCSI devices.
- If two narrow (50-pin) SCSI controllers are each connected to separate system board SCSI connectors, each controller may have seven SCSI devices attached. Counting the controller, this gives a total of 16 SCSI devices on the system.
- HP does not recommend mixing different width SCSI devices on the same SCSI chain or on the same SCSI channel. Mixing devices of different widths on the same chain or channel will always result in a data transfer rate of the slowest machine in that chain. The only exception to this is that Ultra Wide SCSI devices will cause a speed degradation when mixed with other 68-pin devices.
- If multiple SCSI devices are used, split the devices between Channels A and B for optimum performance. Cable length for the second channel should not be longer than 18 inches.
- If two controllers are used, each may use SCSI devices having widths and speeds different from the other. If a 68-pin data cable is used on a controller having 50-pin SCSI devices, use an internal cable adapter (Compaq number 199618-001) or an external cable adapter (Compaq number 270187-B21).

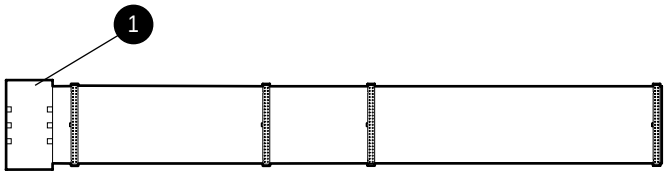
CAUTION: Do not route data cables near the air intake to the power supply. Cables routed in this manner may block the airflow and cause the computer to overheat.

- All SCSI controllers require a unique SCSI ID (0-7 or 8-15) for each SCSI device installed. The controller identifies a SCSI device by its SCSI ID number rather than its location. Moving a SCSI device from one position to another on the SCSI chain does not affect communication between the controller and the device. The reserved and available SCSI ID numbers for SCSI devices are:
  - ❏ 0 is reserved for the primary hard drive.
  - ❏ 7 is reserved for the SCSI controller.
  - ❏ 1 through 6 and 8 through 15 are available for all other SCSI devices.

- 68-pin SCSI controllers require a 53 inch maximum length-twisted pair, LVD cable with built-in terminator, maximum of 5 drives with a minimum driving spacing of 5.25 inches. Every SCSI chain or circuit must be terminated (closed) at both ends. Some system boards have both ends of the SCSI cable connected to, and terminated by, the system board. Termination can be accomplished in one of several ways:
  - ❏ Use a cable with a built-in terminator.
  - ❏ Use a cable with a terminating resistor plug in the last connector.
  - ❏ Connect a SCSI device with its termination enabled into the last connector.
  - ❏ Connect an external SCSI device with its termination enabled to the external SCSI connector on the rear panel of the computer.
- Turn on all external SCSI devices before turning on the power to the computer. This enables the SCSI controller to recognize the external devices.

5.2 Using the Multi-Mode SCSI Cable

Some products ship standard with a multi-mode SCSI cable having a terminator ❶ on one end. This cable supports both low voltage differential (LVD) and single ended (SE) devices. One end of the cable connects to the internal LVD/SE connector on the system board, with the remaining connectors used on the hard drives.



The multi-mode cable included with the computer may differ from the one pictured.

For additional information about installing optional SCSI devices, refer to the documentation included with the device option kit.

5.3 Using SCSI*Select* with SCSI Devices

The Ultra160 and faster SCSI host adapters include the SCSI*Select* utility to configure the host adapter and to run the SCSI disk utilities. To run the SCSI*Select* utility:

- In POST Messages Enabled mode: Press Ctrl+A when the Press<Ctrl><A> for SCSI*Select* Utility message appears during POST.
- In POST Messages Disabled mode: When the Compaq logo screen appears, press any key to exit the logo screen. Immediately after exiting the logo screen, press Ctrl+A to access the SCSI*Select* utility

A menu appears with the following options:

- Configure/View Host Adapter Settings
  - SCSI Bus Interface Definitions
    - Host Adapter SCSI ID
    - SCSI Parity Checking
    - Host Adapter SCSI Termination
  - Additional Options
    - Boot Device Options
    - SCSI Device Configuration
    - Advanced Configuration Options
- SCSI Disk Utilities
  - Lists all SCSI devices and SCSI ID numbers

For additional information about configuring POST message display status, refer to the *Computer Setup Guide*.

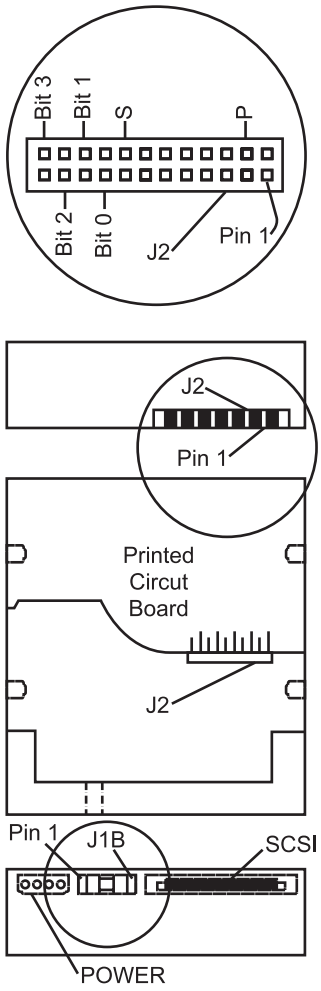
5.4 SMART

The Self Monitoring Analysis and Reporting Technology (SMART) IDE and SCSI hard drives for Compaq Personal Computers and Workstations have built-in drive failure prediction that warns the user or the network administrator of an impending failure or crash of the hard drive. SMART drives track fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, and calibration retry count. If the drive determines that a failure is imminent, it generates a fault alert.

5.5 Jumpers

The specifications included below are the standard drive configurations.

5.5.1 Ultra3 SCSI Hard Drive



SCSI ID Settings

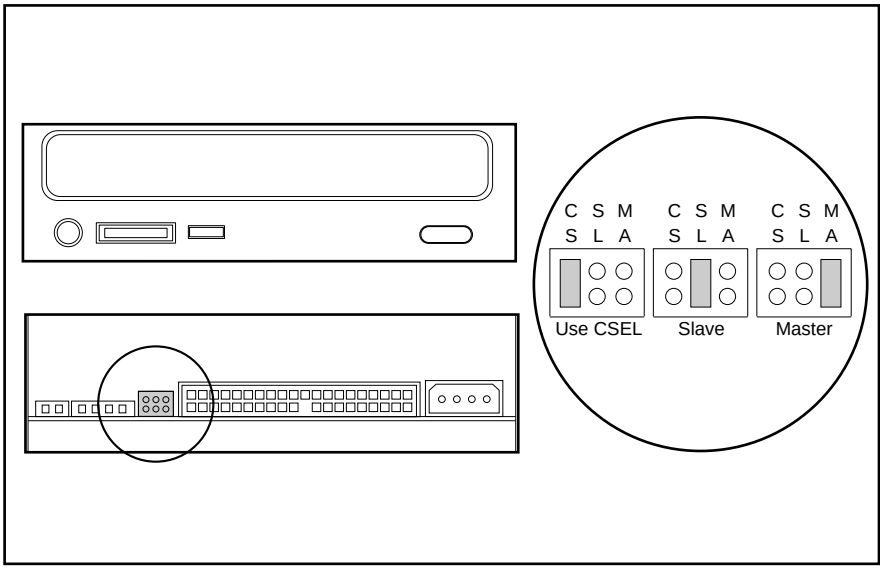
SCSI ID	Bit 2	Bit 1	Bit 0
0			
1			jumper
2		jumper	
3		jumper	jumper
4	jumper		
5	jumper		jumper
6	jumper	jumper	

Default Settings

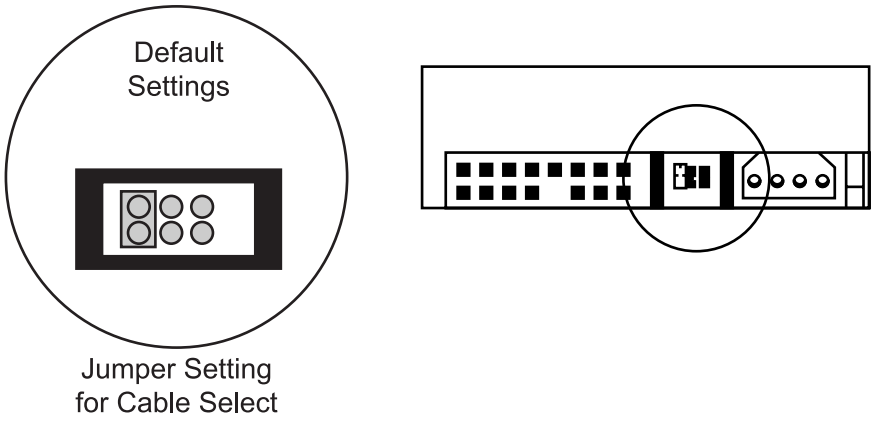
Signal	Description	Jumper
S	Start unit command enabled	
P	Parity enabled	jumper
W	Write protect disabled	
X	Switch data transfer enabled	jumper

1. Drive intended only for non-pluggable applications. Migration to a hot-pluggable drive tray is not supported.
2. All jumper and switch settings shown in the factory default setting, including those not labeled.
3. Termination is disabled/removed.

5.5.2 CD-ROM or DVD-ROM Drive



5.5.3 Zip Drive



Jumper Settings

Configuration	Pair 1	Pair 2	Pair 3
Device 0 (Master)			jumper
Device 1 (Slave)			
Cable Select (Default)	jumper		

After changing the jumper settings, reboot the computer to recognize the new address.

6

Identifying the Chassis, Routine Care, and Disassembly Preparation

This chapter provides general service information for the computer. Adherence to the procedures and precautions described in this chapter is essential for proper service.

CAUTION: When the computer is plugged into an AC power source voltage is always applied to the system board. You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

6.1 Chassis Designations

6.1.1 Convertible Minitower (CMT)

6.1.2 Microtower Type 1(uT, T1)

6.1.3 Microtower Type 2(uT, T2)

6.1.4 Desktop, Type 1 (DT, T1)

6.1.5 Desktop, Type 2 (DT, T2)

6.1.6 Small Form Factor, Type 1 (SFF, T1)

6.1.7 Small Form Factor, Type 2 (SFF, T2)

6.1.8 e-PC

6.1.9 iPAQ

6.1.10 Ultra-Slim Desktop (USDT)

6.2 Electrostatic Discharge Information

A sudden discharge of static electricity from your finger or other conductor can destroy static-sensitive devices or microcircuitry. Often the spark is neither felt nor heard, but damage occurs. An electronic device exposed to electrostatic discharge (ESD) may not appear to be affected at all and can work perfectly throughout a normal cycle. The device may function normally for a while, but it has been degraded in the internal layers, reducing its life expectancy.

Networks built into many integrated circuits provide some protection, but in many cases, the discharge contains enough power to alter device parameters or melt silicon junctions.

6.2.1 Generating Static

The following table shows that:

- Different activities generate different amounts of static electricity.
- Static electricity increases as humidity decreases.

	Relative Humidity		
Event	**55%**	**40%**	**10%**
Walking across carpet	7,500 V	15,000 V	35,000 V
Walking across vinyl floor	3,000 V	5,000 V	12,000 V
Motions of bench worker	400 V	800 V	6,000 V
Removing DIPs* from plastic tube	400 V	700 V	2,000 V
Removing DIPs* from vinyl tray	2,000 V	4,000 V	11,500 V
Removing DIPs* from Styrofoam	3,500 V	5,000 V	14,500 V
Removing bubble pack from PCB	7,000 V	20,000 V	26,500 V
Packing PCBs in foam-lined box	5,000 V	11,000 V	21,000 V

*These are then multi-packaged inside plastic tubes, trays, or Styrofoam.

700 volts can degrade a product.

6.2.2 Preventing Electrostatic Damage to Equipment

Many electronic components are sensitive to ESD. Circuitry design and structure determine the degree of sensitivity. The following packaging and grounding precautions are necessary to prevent damage to electric components and accessories.

- To avoid hand contact, transport products in static-safe containers such as tubes, bags, or boxes.
- Protect all electrostatic parts and assemblies with conductive or approved containers or packaging.
- Keep electrostatic sensitive parts in their containers until they arrive at static-free stations.
- Place items on a grounded surface before removing them from their container.
- Always be properly grounded when touching a sensitive component or assembly.
- Avoid contact with pins, leads, or circuitry.

- Place reusable electrostatic-sensitive parts from assemblies in protective packaging or conductive foam.

6.2.3 Personal Grounding Methods and Equipment

Use the following equipment to prevent static electricity damage to equipment:

- **Wrist straps** are flexible straps with a maximum of one-megohm ± 10% resistance in the ground cords. To provide proper ground, a strap must be worn snug against bare skin. The ground cord must be connected and fit snugly into the banana plug connector on the grounding mat or workstation.
- **Heel straps/Toe straps/Boot straps** can be used at standing workstations and are compatible with most types of shoes or boots. On conductive floors or dissipative floor mats, use them on both feet with a maximum of one-megohm ± 10% resistance between the operator and ground.

Static Shielding Protection Levels

Method	Voltage
Antistatic plastic	1,500
Carbon-loaded plastic	7,500
Metallized laminate	15,000

6.2.4 Grounding the Work Area

To prevent static damage at the work area, use the following precautions:

- Cover the work surface with approved static-dissipative material. Provide a wrist strap connected to the work surface and properly grounded tools and equipment.
- Use static-dissipative mats, foot straps, or air ionizers to give added protection.
- Handle electrostatic sensitive components, parts, and assemblies by the case or PCB laminate. Handle them only at static-free work areas.
- Turn off power and input signals before inserting and removing connectors or test equipment.
- Use fixtures made of static-safe materials when fixtures must directly contact dissipative surfaces.
- Keep work area free of nonconductive materials such as ordinary plastic assembly aids and Styrofoam.
- Use field service tools, such as cutters, screwdrivers, and vacuums, that are conductive.

6.2.5 Recommended Materials and Equipment

Materials and equipment that are recommended for use in preventing static electricity include:

- Antistatic tape
- Antistatic smocks, aprons, or sleeve protectors
- Conductive bins and other assembly or soldering aids
- Conductive foam
- Conductive tabletop workstations with ground cord of one-megohm +/- 10% resistance

- Static-dissipative table or floor mats with hard tie to ground
- Field service kits
- Static awareness labels
- Wrist straps and footwear straps providing one-megohm +/- 10% resistance
- Material handling packages
- Conductive plastic bags
- Conductive plastic tubes
- Conductive tote boxes
- Opaque shielding bags
- Transparent metallized shielding bags
- Transparent shielding tubes

6.3 Routine Care

6.3.1 General Cleaning Safety Precautions

1. Never use solvents or flammable solutions to clean the computer.
2. Never immerse any parts in water or cleaning solutions; apply any liquids to a clean cloth and then use the cloth on the component.
3. Always unplug the computer when cleaning with liquids or damp cloths.
4. Always unplug the computer before cleaning the keyboard, mouse, or air vents.
5. Disconnect the keyboard before cleaning it.
6. Wear safety glasses equipped with side shields when cleaning the keyboard.

6.3.2 Cleaning the Computer Case

Follow all safety precautions in Section 6.2.1 before cleaning the computer.

To clean the computer case, follow the procedures described below:

- To remove light stains or dirt, use plain water with a clean, lint-free cloth or swab.
- For stronger stains, use a mild dishwashing liquid diluted with water. Rinse well by wiping it with a cloth or swab dampened with clear water.
- For stubborn stains, use isopropyl (rubbing) alcohol. No rinsing is needed as the alcohol will evaporate quickly and not leave a residue.
- After cleaning, always wipe the unit with a clean, lint-free cloth.
- Occasionally clean the air vents on the computer. Lint and other foreign matter can block the vents and limit the airflow.

6.3.3 Cleaning the Keyboard

Follow all safety precautions in Section 6.2.1 before cleaning the keyboard.

To clean the tops of the keys or the keyboard body, follow the procedures described in Section 6.2.2.

When cleaning debris from under the keys, review all rules in Section 6.2.1 before following these procedures:

CAUTION: Use safety glasses equipped with side shields before attempting to clean debris from under the keys.

- Visible debris underneath or between the keys may be removed by vacuuming or shaking.
- Canned, pressurized air may be used to clean debris from under the keys. Caution should be used as too much air pressure can dislodge lubricants applied under the wide keys.
- If you remove a key, use a specially designed key puller to prevent damage to the keys. This tool is available through many electronic supply outlets.

CAUTION: Never remove a wide leveled key (like the space bar) from the keyboard. If these keys are improperly removed or installed, the keyboard may not function properly.

- Cleaning under a key may be done with a swab moistened with isopropyl alcohol and squeezed out. Be careful not to wipe away lubricants necessary for proper key functions. Use tweezers to remove any fibers or dirt in confined areas. Allow the parts to air dry before reassembly.

6.3.4 Cleaning the Monitor

- Wipe the monitor screen with a clean cloth moistened with water or with a towelette designed for cleaning monitors. Do not use sprays or aerosols directly on the screen; the liquid may seep into the housing and damage a component. Never use solvents or flammable liquids on the monitor.
- To clean the monitor body follow the procedures in Section 6.2.2.

6.3.5 Cleaning the Mouse

Before cleaning the mouse, ensure that the power to the computer is turned off.

- Clean the mouse ball by first removing the retaining plate and the ball from the housing. Pull out any debris from the ball socket and wipe the ball with a clean, dry cloth before reassembly.
- To clean the mouse body, follow the procedures in 6.2.2.

6.4 Service Considerations

Listed below are some of the considerations that you should keep in mind during the disassembly and assembly of the computer.

6.4.1 Power Supply Fan

The power supply fan is a variable-speed fan based on the temperature in the power supply.

CAUTION: The cooling fan is off **only** when the computer is turned off or the power cable has been disconnected.

The cooling fan is always on when the computer is either in the "On," "Standby," or "Suspend" modes.

You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

6.4.2 Tools and Software Requirements

To service the computer, you need the following:

- Torx T-15 screwdriver (Compaq screwdriver with bits, PN 161946-001)
- Torx T-15 screwdriver with small diameter shank (for certain front bezel removal)
- Flat-bladed screwdriver (may sometimes be used in place of the Torx screwdriver)
- Diagnostics software
- Compaq tamper-resistant T-15 wrench (Smart Cover FailSafe Key, PN 166527-001) or Compaq tamper-resistant bits (Smart Cover FailSafe Key, PN 166527-002)

6.4.3 Screws

The screws used in the computer are not interchangeable. They may have standard or metric threads and may be of different lengths. If an incorrect screw is used during the reassembly process, it can damage the unit. HP strongly recommends that all screws removed during disassembly be kept with the part that was removed, then returned to their proper locations.

Metric screws have a black finish.
U.S. screws have a silver finish.

As each subassembly is removed from the computer, it should be placed away from the work area to prevent damage.

6.4.4 Cables and Connectors

Most cables used throughout the unit are flat, flexible cables. These cables must be handled with care to avoid damage. Apply only the tension required to seat or unseat the cables during insertion or removal from the connector. Handle cables by the connector whenever possible. In all cases, avoid bending or twisting the cables, and ensure that the cables are routed in such a way that they cannot be caught or snagged by parts being removed or replaced.

CAUTION: When servicing this computer, ensure that cables are placed in their proper location during the reassembly process. Improper cable placement can damage the computer.

6.4.5 Hard Drives

Handle hard drives as delicate, precision components, avoiding all physical shock and vibration. This applies to failed drives as well as replacement spares.

- If a drive must be mailed, place the drive in a bubble-pack mailer or other suitable protective packaging and label the package “Fragile: Handle With Care.”
- Do not remove hard drives from the shipping package for storage. Keep hard drives in their protective packaging until they are actually mounted in the CPU.
- Avoid dropping drives from any height onto any surface.
- If you are inserting or removing a hard drive, turn off the computer. Do not remove a hard drive while the computer is on or in standby mode.
- Before handling a drive, ensure that you are discharged of static electricity. While handling a drive, avoid touching the connector. For more information about preventing electrostatic damage, refer to Section 6.1, “Electrostatic Discharge Information.”
- Do not use excessive force when inserting a drive.
- Avoid exposing a hard drive to liquids, temperature extremes, or products that have magnetic fields such as monitors or speakers.

6.4.6 Lithium Coin Cell Battery

The battery that comes with the computer provides power to the real-time clock and has a minimum lifetime of about three years.

See Chapter 11, “Battery” for instructions on the replacement procedures.

WARNING: This computer contains a lithium battery. There is a risk of fire and chemical burn if the battery is handled improperly. Do not disassemble, crush, puncture, short external contacts, dispose in water or fire, or expose it to temperatures higher than 140°F (60°C).

CAUTION: Batteries, battery packs, and accumulators should not be disposed of together with the general household waste.

7

Removal and Replacement Procedures Security Components

For an overview of the different chassis discussed in this chapter, refer to Chapter 6 “Identifying the Chassis, Routine Care, and Disassembly Preparation.” The chassis are: Convertible Minitower (CMT), Microtower, T (uT), Desktop (DT), Small Form Factor (SFF), Ultra-Slim Desktop, iPAQ. and the e-PC.

This chapter provides general service information for the computer. Adherence to the procedures and precautions described in this chapter is essential for proper service. After completing all necessary removal and replacement procedures, run the Diagnostics utility to verify that all components operate properly.

Not all features listed in this guide are available on all computers.

7.1 Preparation for Disassembly

See Chapter 6, “Identifying the Chassis, Routine Care, and Disassembly Preparation,” for initial procedures.

1. Remove/disengage any security devices that prohibit opening the computer.
2. Close any open software applications.
3. Exit the operating system.
4. Remove any diskette, compact disc, or MultiBay device from the computer.
5. Turn off the computer and any peripheral devices that are connected to it.

CAUTION: Turn off the computer before disconnecting any cables.

CAUTION: Regeardless of the power-on state, voltage is always present in certain areas of the system as long as the system is plugged into an active AC outlet. In some systems the cooling fan is on even when the computer is in the “Standby,” or “Suspend” modes. The power cord should always be disconnected before servicing a unit.

6. Disconnect the power cord from the electrical outlet and then from the computer.
7. Disconnect all peripheral device cables from the computer.

During disassembly, label each cable as you remove it, noting its position and routing. Keep all screws with the units removed.

CAUTION: The screws used in the computer are of different thread sizes and lengths; using the wrong screw in an application may damage the unit.

7.2 Security Devices

7.2.1 Smart Cover Lock

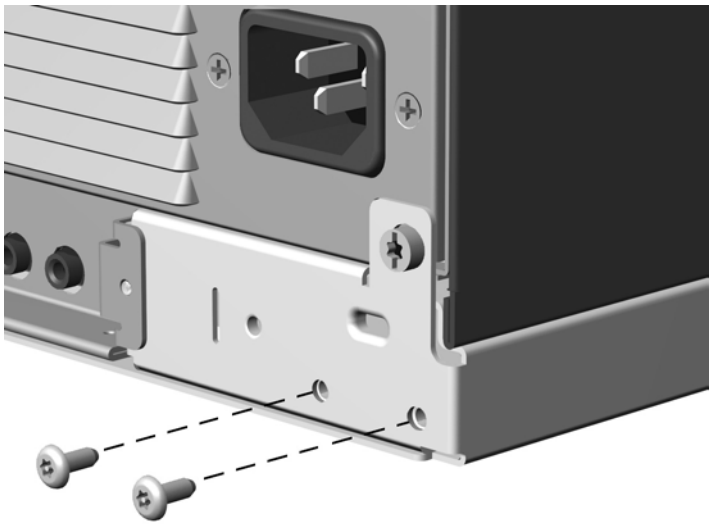
The Smart Cover Lock is a software-controllable cover lock found on some desktop personal computers and workstations. This lock prevents unauthorized access to the internal components when the Smart Cover Lock and setup password are enabled.

If you enabled the Smart Cover Lock, use Computer Setup to unlock it. If you cannot enter your password to disable the lock, you will need a Smart Cover FailSafe Key (Compaq spare PN 166527-001 or 166527-002) to open the computer cover. You will also need the key in any of the following circumstances:

- Power outage
- Startup failure
- PC component (e.g., processor or power supply) failure
- Lost password

CAUTION: The cooling fan is off **only** when the computer is turned off or the power cable has been disconnected. The cooling fan is always on when the computer is in the "On," "Standby," or "Suspend" modes. You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

1. Prepare the computer for disassembly.
2. Using the Smart Cover FailSafe Key, remove the two tamper-proof screws that secure the Smart Cover Lock to the chassis. Use the special Compaq tamper-resistant T-15 wrench (PN 166527-001) or screwdriver bit (PN 166527-002) for this operation.



SFF Unit Shown

3. Remove the access panel and then remove the Smart Cover Lock.

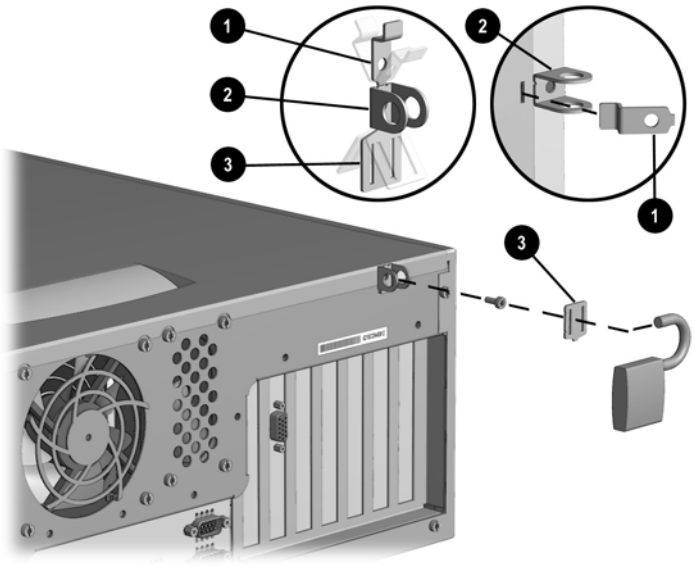
To reattach the Smart Cover Lock, secure the lock in place with the tamper-proof screws.

7.2.2 Compaq Type 1 Security Bracket

WARNING: To avoid injury, use care in handling the separated pieces of the cable lock bracket; metal edges may be sharp. Be sure to install the bracket so that sharp edges do not extend from the edges of the computer chassis.

Depending on the model, the computer includes a cable lock provision, which consists of a three-piece security bracket. The bottom part of the bracket is attached to the computer with a screw; the top part of the bracket covers the screw and prevents its removal.

1. Separate the pieces of the security bracket by bending the metal where the three pieces join.
2. Slide the tab on the narrow piece of the bracket into the notch on the back of the computer and rotate this piece toward the screw hole, then slide the U-shaped piece of the bracket between the narrow piece and the computer.
3. Position both pieces of the bracket over the screw hole and secure the bracket to the computer with the screw provided.
4. Cover the screw with the flat portion of the security bracket.
5. Install a padlock (not provided) to secure the top part of the security bracket and inhibit access to the inside of the computer. Install a cable lock (not provided) to inhibit access to the interior of the computer and secure the computer to a fixed object.



CMT Unit Shown

To remove the cable lock provision, reverse the above procedure.

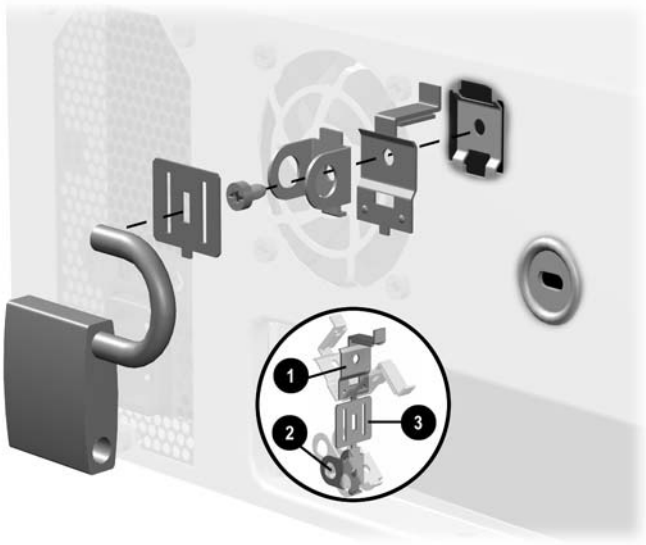
7.2.3 Compaq Type 2 Security Bracket

This bracket is designed for use on desktop chassis having two cable lock bracket mounting holes. The bracket may be used either with a standard padlock or a Kensington or other cable lock depending on the opening selected on the computer.

WARNING: To avoid injury, use care in handling the separated pieces of the cable lock bracket; metal edges may be sharp. Be sure to install the bracket so that sharp edges do not extend from the edges of the computer chassis.

When using the upper mounting hole on the chassis with a standard padlock, complete these steps:

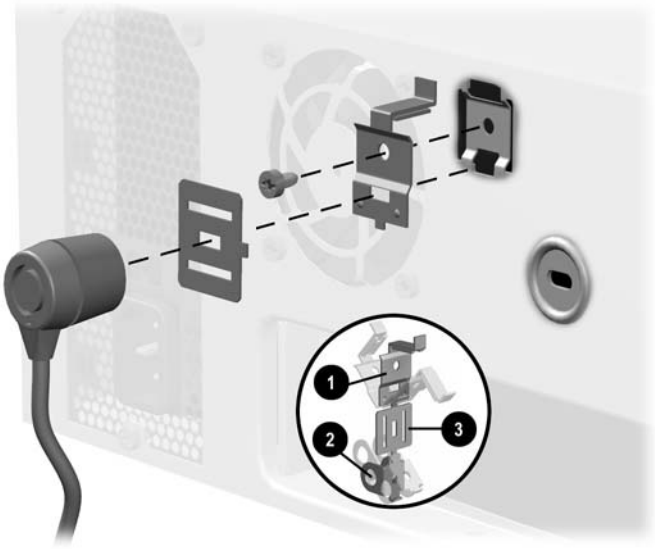
1. Separate the pieces of the security bracket by bending the metal where the three pieces join.
2. Slide the tab on the dog-legged piece of the bracket ❶ into the notch on the back of the computer and rotate this piece toward the screw hole; then, position the U-shaped piece of the bracket ❷ over the screw hole and secure the bracket to the computer with the screw provided.
3. Cover the screw with the flat portion of the security bracket ❸. Then, install a padlock (not provided) to secure the top part of the security bracket and inhibit access to the inside of the computer. Install a cable (not provided) to inhibit access and to secure the computer to a fixed object.



Microtower Unit Shown

If a cable lock is used with a Type 2 security bracket complete these steps:

4. Separate the pieces of the security bracket by bending the metal where the three pieces join.
5. Slide the tab on the dog-legged piece of the bracket ❶ into the notch on the back of the computer and rotate this piece toward the screw hole; then, secure the bracket to the computer with the screw provided.
6. Cover the screw with the flat portion of the security bracket ❸.
7. Install the cable lock.

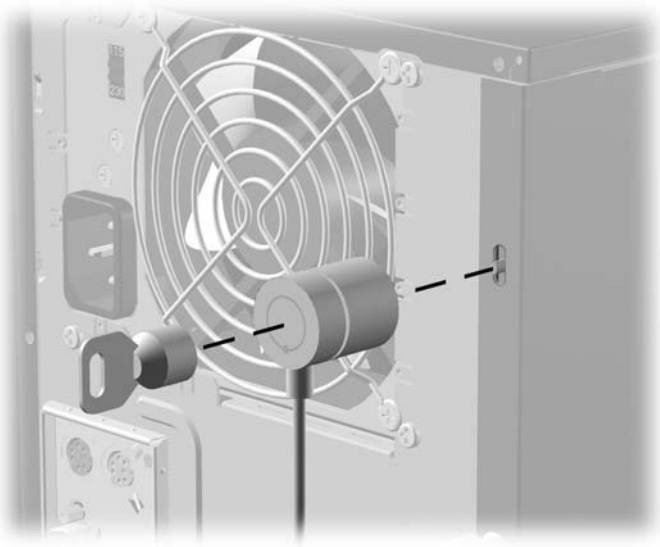


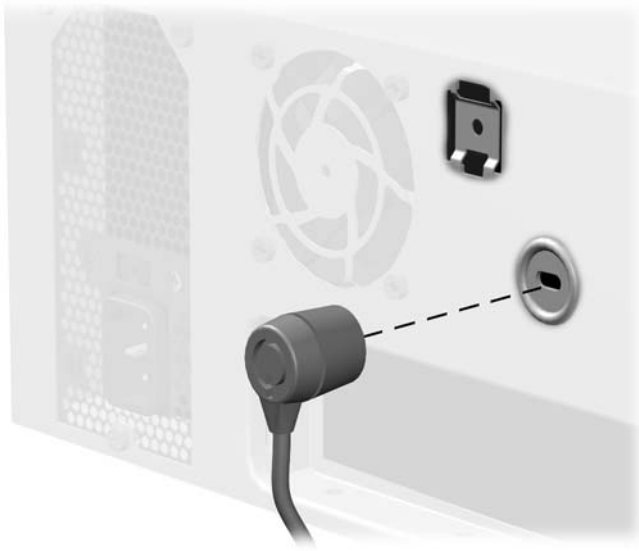
Microtower Unit Shown

7.2.4 Kensington Cable Lock

Depending on the model, the rear panel of the computer accommodates a cable lock so that the computer can be physically secured to a work area

1. Loop the cable around a heavy, fixed object to which you want to secure the computer.
2. Insert the cable lock end of the cable through the loop end of the cable.
3. Insert the lock into the appropriate slot on the rear of the computer and lock with the key.



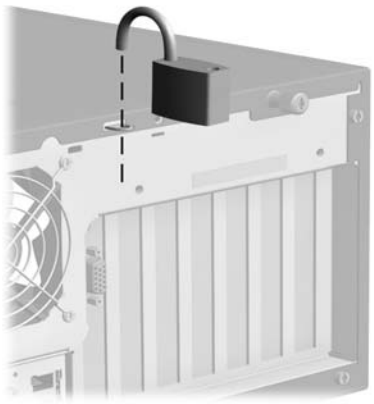


To remove the cable lock provision, reverse the above procedure.

7.2.5 Security Loop

The single security bracket mounting hole allows you an alternate way to secure access to your computer.

Install a small padlock (not provided) through the flange loop that protrudes through of the lip of the access panel to inhibit access to the inside of the computer.



CMT Unit Shown

7.2.6 iPAQ Security Bar

1. Prepare the computer for disassembly.

WARNING: Regardless of the unit's power state, voltage is present in certain areas of the computer as long as the unit is plugged into an active AC outlet. To prevent damage to the unit, disconnect the power cord from the power source or the unit before beginning disassembly procedures.

2. Remove the security bar retaining screw. Use the special Compaq tamper-resistant T-15 wrench (PN 166527-001) or screwdriver bit (PN 166527-002) for this operation.
3. Remove the security bar.

To install the security bar, reverse the above procedure.

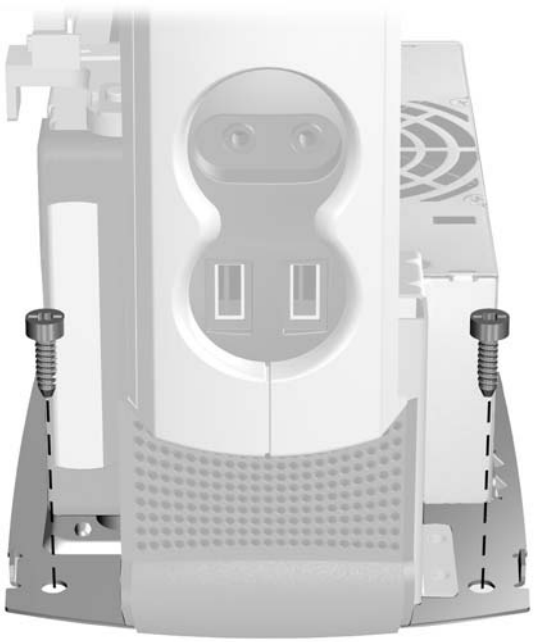
7.2.7 iPAQ Desk Attachment

1. Prepare the computer for disassembly.
2. Remove the left and right exterior access panels.
3. Place the computer in the desired position and remove the two front rubber feet to gain acces to the mounting holes.
4. Mark through the mounting holes to accurately locate where the fasteners will be installed.
5. Move the computer; then drill pilot holes in the mounting surface to accept the fasteners.

CAUTION: Do not drill any holes through the computer chassis. Use the existing holes in the chassis to layout the location of the desired holes.

6. Reposition the computer and install the fasteners through the computer chassis.

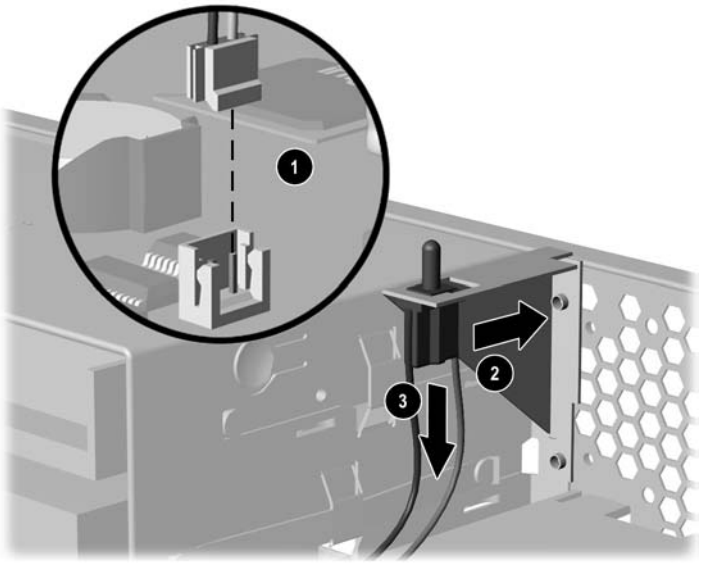
#14 Screws are recommended for this installation.



7. Reinstall the exterior access panels.

7.3 Hood Sensor

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Rotate the drive cage to the upright position (select models).
4. Disconnect the power cable from the system board ❶.
5. Push the sensor toward the front of the computer ❷.
6. Pull the sensor down through the hole in which it sits to remove it from the chassis ❸ and lift it out of the computer.



DT shown

To install the hood sensor, reverse the removal procedure.

8

Removal and Replacement Procedures Drives

For an overview of the different chassis discussed in this chapter, refer to Chapter 6 “Identifying the Chassis, Routine Care, and Disassembly Preparation.” The chassis are: Convertible Minitower (CMT), Microtower, T (uT), Desktop (DT), Small Form Factor (SFF), Ultra-Slim Desktop, iPAQ. and the e-PC.

WARNING: Power is present in certain areas wihin the computer even when the power switch is turned off. To prevent personal injury or damage to the unit, disconnect the power cord from the power source or the unit before beginning disassembly procedures

8.1 Drives

When installing additional drives, follow these guidelines:

- For optimal performance, connect hard drives to the primary controller. Connect expansion devices, such as CD-ROM, IDE tape, and diskette drives to the secondary controller.

Refer to chapter 4 for more detailed information on Ultra ATA drives and to chapter 5 for SCSI drives.

- You must install guide screws to ensure that the drive lines up correctly in the drive cage. HP has provided extra guide screws, which are installed in the front of the computer chassis, behind the front bezel. Some options require metric hardware. HP/Compaq-supplied metric screws are black.
- Drive installation requires no jumper setting changes on the existing or optional drives. All factory drives have the jumpers preset for cable-select installation.
- The system automatically recognizes Plug and Play hard drives and will automatically reconfigure the computer. If you installed a third-party hard drive, or one that is not a Plug and Play device, you must run Computer Setup to reconfigure the computer.

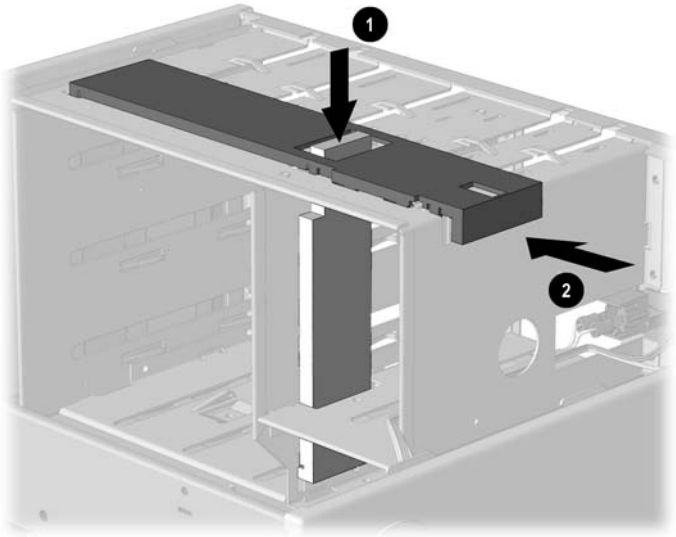
If installing a second device on the primary controller, you must use an 80-conductor Ultra ATA cable for optimal performance. This cable is available as a Compaq option.

CAUTION: When servicing the computer, ensure that cables are placed in their proper locations during the reassembly process. Improper cable placement can damage the computer.

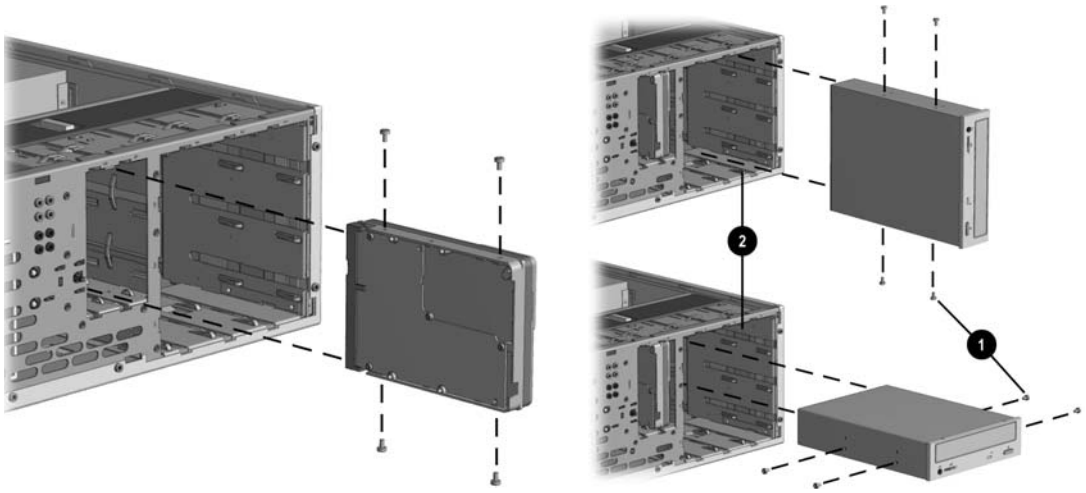
8.1.1 Convertible Minitower

Removing a Drive

1. Prepare the computer for disassembly.
2. Lay the computer down on its large base (side with feet) for greater stability.
3. Remove the access panel.
4. Remove the front bezel.
5. Disconnect the power, data, and audio (if applicable) cables from the back of the drive.
6. Press the drivelock mechanism to unlock the drives. Drivelock ❶ secures the external drives in the desktop configuration; drivelock ❷ secures all drives in the minitower configuration and the internal drives in the desktop configuration.



7. While holding the drivelock in the unlocked position, remove the drive from the drive bay.



8. Remove the four guide screws from the drive.
9. Install two guide screws on each side of the replacement drive.

Metric screws (M3) have a black finish; U.S. screws have a silver finish.

Replace the drive by reversing the above procedure.

CAUTION: Use only 3/16-inch or 5-mm long screws as guide screws. Longer screws can damage the internal components of the drive.

Installing a New Drive

1. Install two guide screws on each side of the replacement drive ❶.
2. Ensure that the guide screws line up with the guide slots ❷, then slide the drive into the drive bay until it snaps into place.
3. Connect the power and signal cables to the back of the drive.
4. Remove the bezel blank from the subpanel, if necessary.
5. Reinstall the subpanel and the front bezel.

Refer to the previous drawing for these steps.

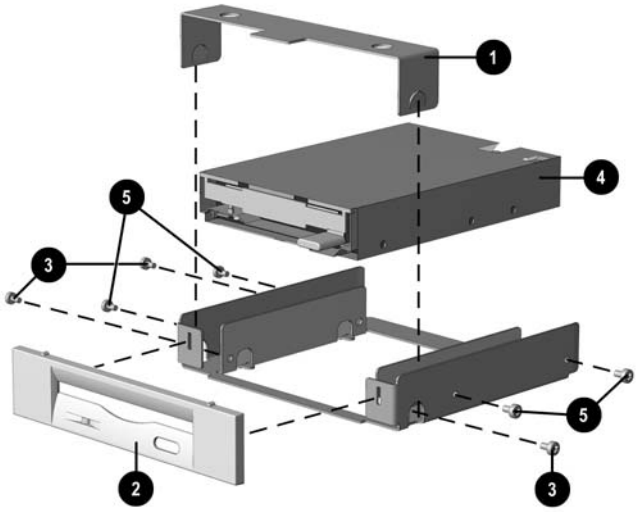
Removing a 3.5-Inch Drive from a 5.25-Inch Drive Adapter

A 3.5-inch drive must be installed into a 5.25-inch drive adapter in order to install the smaller drive into a standard 5.25-inch drive bay.

1. Remove the bracket brace ❶ from the top of the drive adapter by squeezing inward on both sides, then rotating the brace up and out.
2. Remove the drive bezel ❷.

Buttonless drives use a different front bezel but the removal procedure is the same.

3. Remove the three screws ❸ that secure the drive to the left and right sides of the drive adapter.
4. Slide the drive ❹ to the rear of the drive adapter until the diskette drive eject button is free of the button protector, then lift the drive out of the drive adapter.
5. Remove the guide screws from the drive ❺.



To replace the drive, reverse the previous procedures.

The primary 3.5-inch diskette drive should only be installed into bay 3. Bay 3 is the bottom bay in the minitower and the topmost bay in the desktop configuration.

When replacing the drive, use the existing screws. Metric screws (M3) have a black finish while U.S. screws (#6) have a silver finish.

CAUTION: Use only 3/16-inch or 5-mm long screws as guide screws. Longer screws can damage the internal components of the drive.

8.1.2 Small Form Factor

Drives secured with J-slots have release levers in varying locations near the drive.

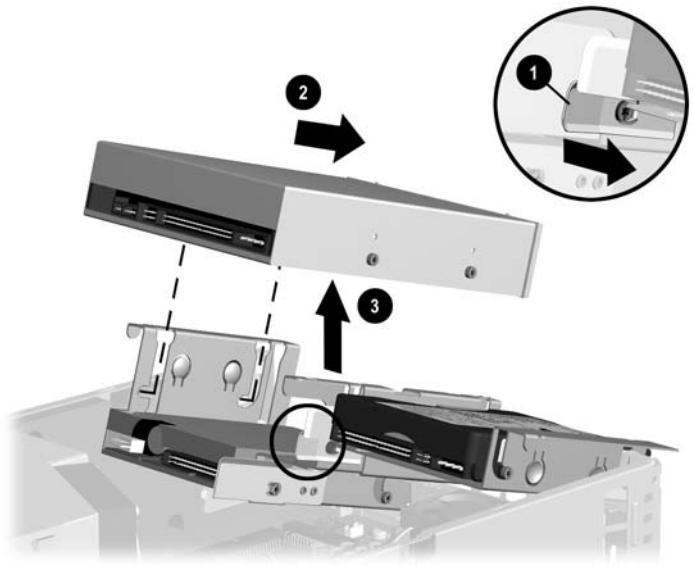
The two small form factor chassis contain virtually the same components; however, the orientation of components is mirrored between the two chassis.

5.25-Inch Drives

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Rotate the drive cage to the upright position.
4. Disconnect the drive power cable, signal cable, and audio connector from the drive, if applicable.
5. Pull the drive release latch away from the drive ❶.

Drive release latch location may vary.

6. Slide the drive toward the front of the drive cage ❷, then lift the drive out of the computer ❸.



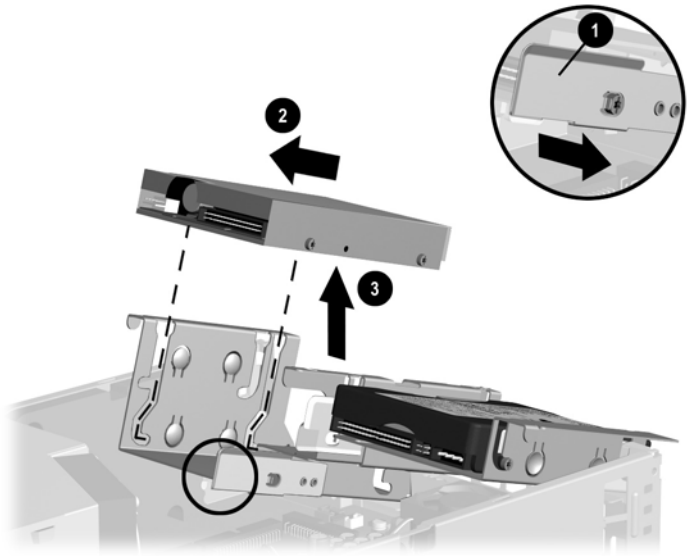
SFF, T1 shown

When replacing the drive, transfer the four screws from the old drive to the new one. The screws take the place of drive rails.

To replace the drive, reverse the removal procedure.

Diskette Drive

1. Prepare the computer for disassembly.
2. Remove computer cover.
3. Remove the 5.25-inch drive.
4. Disconnect the power and data cables from the back of the drive.
5. Pull the green drive release latch away from the drive ❶.
6. Lift the drive from the drive cage by first pulling the drive toward the back of the cage ❷, then lifting the drive up and out of the drive cage ❸.



SFF, T1 shown

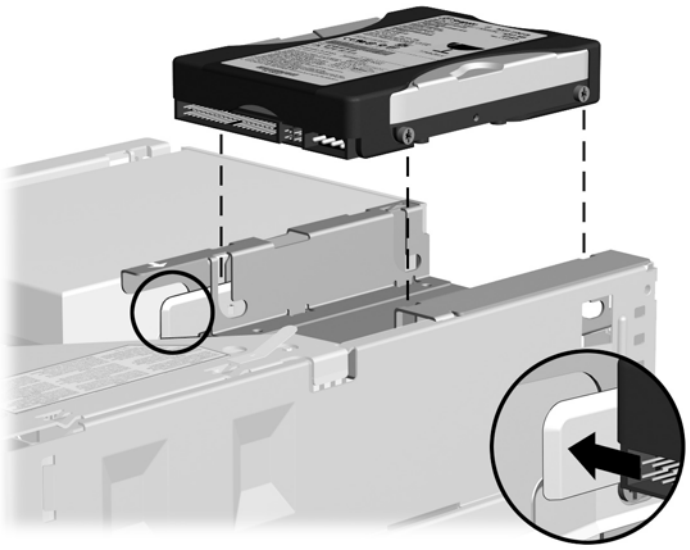
To install a drive, reverse the removal procedure.

When replacing the drive, transfer the four guide screws from the old drive to the new one. The guide screws take the place of drive rails.

CAUTION: When servicing the computer, ensure the cables are placed in their proper locations during the reassembly process. Improper cable placement can damage the computer.

Hard Drive

1. Prepare the computer for disassembly.
2. Remove the computer cover.
3. Push the drive release latch away from the drive.
4. Slide the drive toward the rear of the drive cage, then lift the drive from the computer.
5. Disconnect the power and data cable from the back of the drive.



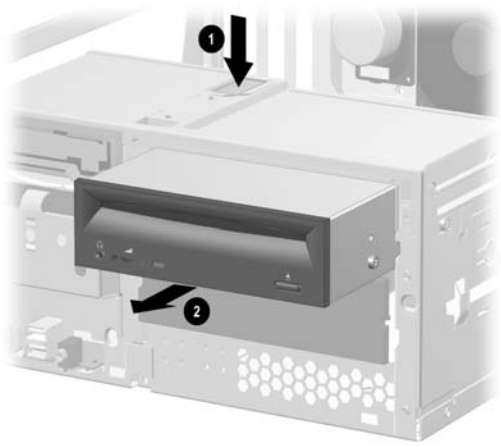
SFF, T1

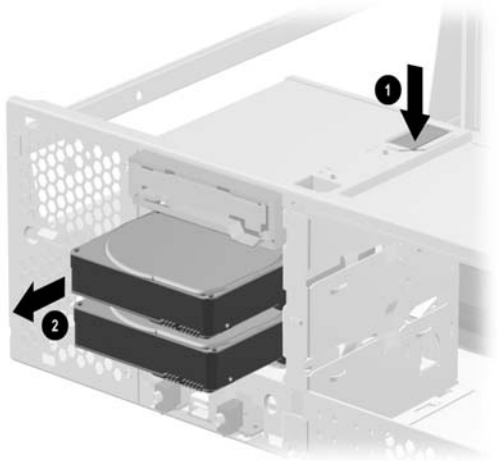
To install a drive, reverse the removal procedure.

8.1.3 Desktop

Removing a Drive from the Drive Bay

1. Prepare the computer for disassembly.
2. Remove the computer cover.
3. Remove the front bezel.
4. Disconnect the drive power and signal cables and, if it is a CD-ROM or DVD-ROM drive, disconnect the audio connector.
5. If removing a hard drive, remove the power switch bracket, leaving its cable connected to the system board, to gain access to the drive bay.
6. Press the drivelock mechanism ❶ to unlock the drive in the drive bay.
7. While pressing the drivelock ❶, pull the drive out of the drive bay ❷.





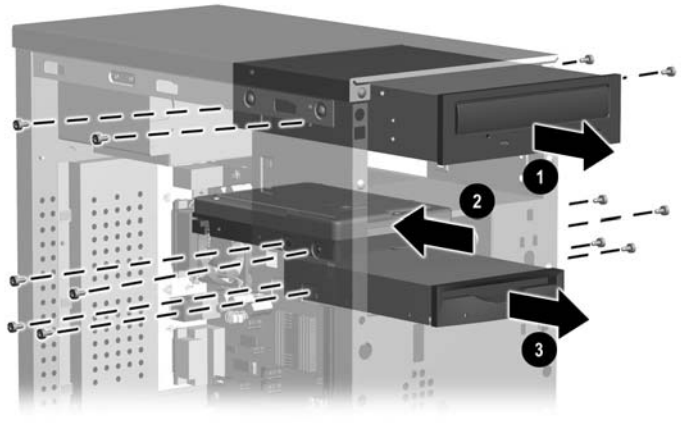
8. Remove the drive from the drive bay and store in anti-static packaging.

To replace a drive, reverse the above procedure.

8.1.4 Microtower, Type 1

Drive Removal

1. Prepare the computer for disassembly.
2. Remove both access panels.
3. Remove the front bezel.
4. Disconnect the power, data, and audio cables, as necessary, from the back of the drive.
5. Remove the four screws, two from each side, that connect the drive to the drive cage.
6. Slide the drive out of the drive cage, as shown in the illustration below.



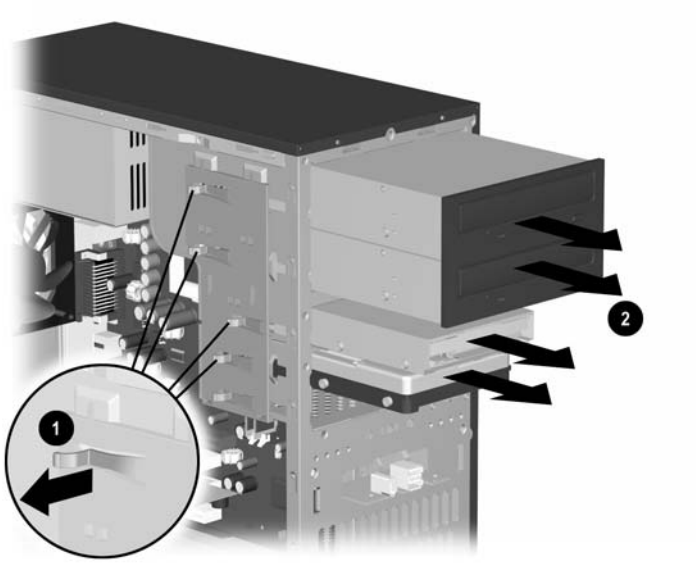
Drive Identification	
❶	5.25-Inch Drive
❷	Hard Drive
❸	Diskette Drive

To replace a drive, reverse the above procedure.

8.1.5 Microtower Type 2

To remove a drive from the Microtower Type 2 chassis procede as follows:

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Disconnect the power and data cables from the back of the drive.
4. Remove the front bezel.
5. Press back the drivelock tab ❶ that secures the drive inside the chassis.



6. While holding the drivelock tab in the unlocked position, remove the drive ❷ from the drive bay.

To install a replcement drive procede as follows:

1. Remove the four guide screws (two on each side) from the removed drive.
2. Install two guide screws on each side of the replacement drive.

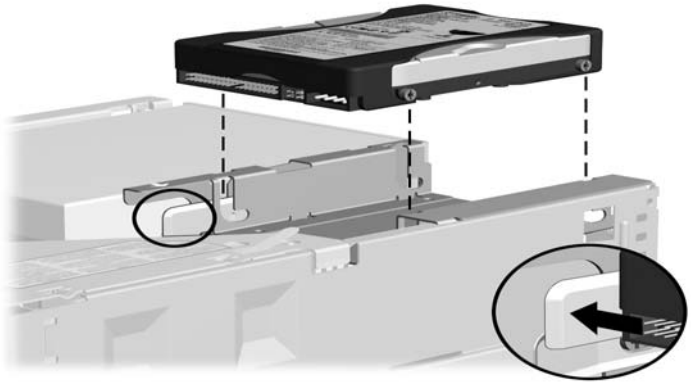
CAUTION: Use only the supplied 3/16-inch or 5-mm long screws as guide screws. Longer screws can damage the internal components of the drive. Screws with a different head size may damage or not engage the drivelock mechanism.

3. Insert the replacement drive into the bay until it snaps into place.
4. Connect the data and power cables to the drive.
5. Replace the front bezel.
6. Replace the access panel.

8.1.6 Ultra-Slim Desktop

Drive Removal

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Gently pull the release lever away from the hard drive.



Ultra-Slim Desktop shown

4. Slide the drive toward the power supply, then lift the drive up and out of the computer.
5. Disconnect the flat ribbon data cable and power cable from the hard drive.

When removing cables, pull the tab or connector instead of the cable itself. This will help prevent cable damage.

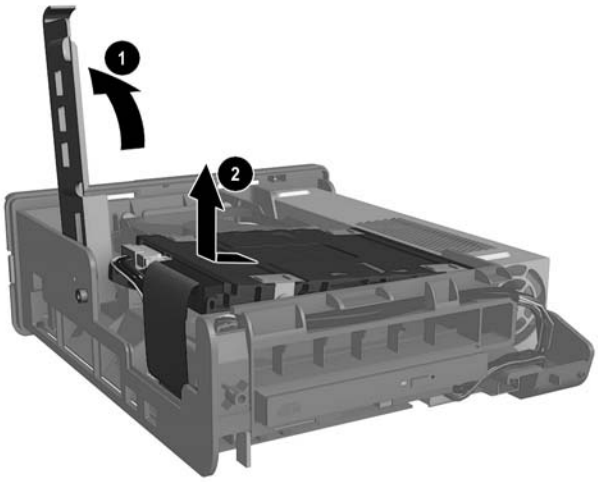
6. Lift the drive from the drive cage.

To install a drive, reverse the removal procedure.

8.1.7 e-PC

Hard Drive Removal

1. Prepare the computer for disassembly.
2. Remove the cover as described in Chapter 9, section 9.1.5.
3. Pull the green release lever up from the front of the chassis and rotate to a vertical position as shown.



4. Slide the hard drive toward the left side of the chassis a short distance and then lift the drive straight up and out.

If accessing a component or connector directly under the hard drive, the hard drive assembly need not be disconnected but may be flipped over and laid flat on the work surface to the left of the unit.

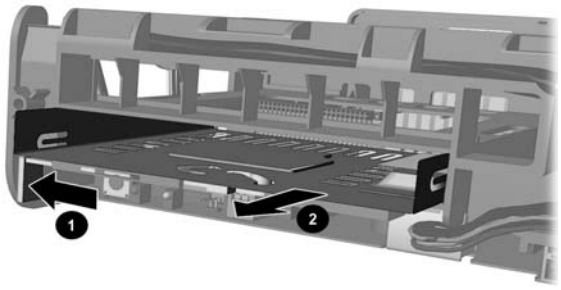
5. For complete removal of the hard drive disconnect the data and power cables.

Replace the drive by reversing the above procedure.

CAUTION: Insure that the hard drive assembly does not pinch the power supply cable. The hard drive data and power cables should always be routed over (on top of) the power supply cable.

Optical Drive Removal

1. Prepare the computer for disassembly.
2. Remove the cover as described in Chapter 9, section 9.1.5.
3. Remove the hard drive as described in the previous procedure.
4. Slide the green release lever ❶ at the front of the chassis toward the left and hold while pulling the drive ❷ partially out from the chassis.



5. Disconnect the cable from the drive.
6. Remove the drive from the chassis.

Installation is the reverse of removal.

9

Removal and Replacement Procedures Chassis

For an overview of the different chassis discussed in this chapter, refer to Chapter 6 “Identifying the Chassis, Routine Care, and Disassembly Preparation.” The chassis are: Convertible Minitower (CMT), Microtower, T (uT), Desktop (DT), Small Form Factor (SFF), Ultra-Slim Desktop, iPAQ, and the ePC.

CAUTION: When the computer is plugged into an AC power source, voltage is always applied to the system board. You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

9.1 Access Panel/Computer Cover

CAUTION: The cooling fan is off **only** when the computer is turned off or the power cable has been disconnected. The cooling fan is always on when the computer is in the “On,” “Standby,” or “Suspend” modes.

Access to the interior of the computer requires removing one or more of the following:

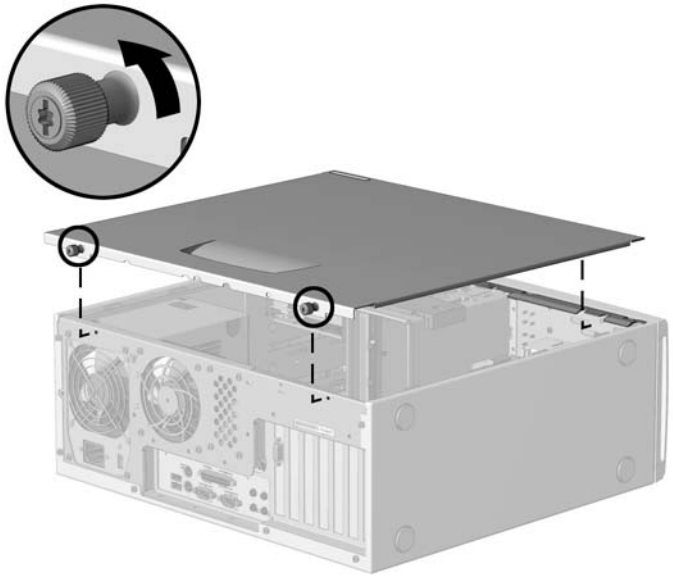
- Access panel on convetible minitowers and iPAQ models
- Outter access panels on iPAQ models
- Computer cover on desktops and small form factors

9.1.1 Access Panel Models with Thumbscrews

1. Prepare the computer for disassembly.
2. Loosen the thumbscrews that secure the access panel to the back of the computer chassis (some chassis have only a single thumbscrew).

Not all thumbscrews used are captive. Thumbscrew design may vary by model.

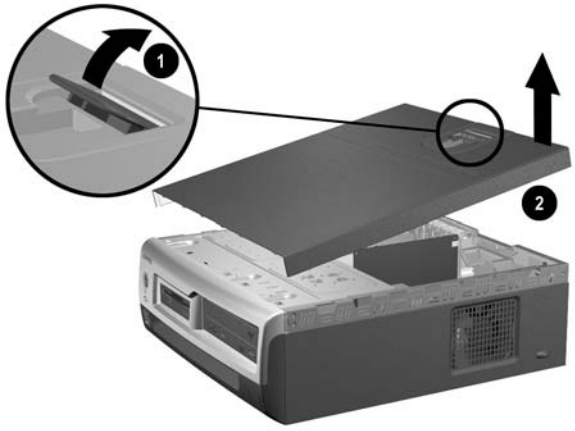
3. Slide the access panel backward approximately 1-inch (2.5-cm); then lift it up and off the unit.



CMT shown

9.1.2 Access Panel Models with Integral Latch

1. Prepare the computer for disassembly.
2. Lift the integral latch ❶ to release the access panel.
3. Raise the access panel about 1-inch (2.5-cm); then lift it up ❷ and off the unit.



To replace the access panel, insert the front edge of the access panel into the groove on the top of the chassis and lower the panel into position. Make sure that the integral latch is open before seating the panel into its finalposition.

9.1.3 iPAQ Access Panels

Outer Access Panels

1. Prepare the computer for disassembly.
2. Eject the drive from the MultiBay.
3. Press down on the tab on the top of the access panel ❶. Rotate the panel away from the computer.
4. Lift the panel from the two tabs on the bottom wing of the chassis ❷ to gain full access to the side of the computer.

To replace the access panels, align the slots on the bottom of the panel with the tabs on the chassis ❷. Snap the panel into place.

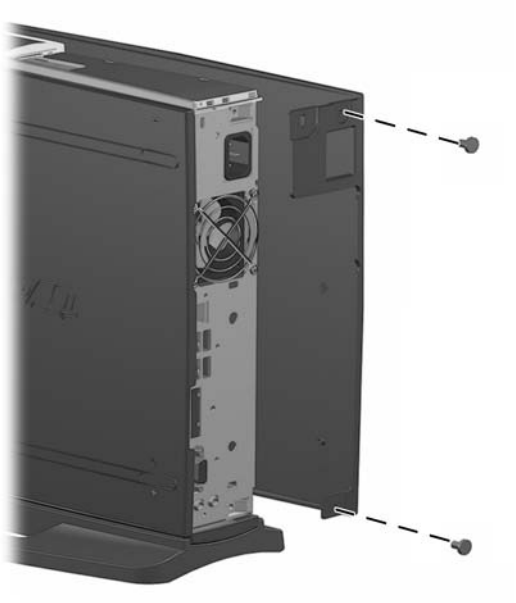
Inner Access Panel

1. Prepare the computer for disassembly.
2. Remove the right access panel.
3. Remove the three screws that secure the inner access panel to the chassis.
4. Slide the inner panel towards the rear of the computer and lift it out.

To replace the inner access panel, reverse the previous steps. Angle the inner panel towards the front of the computer and align the hook on the bottom of the inner panel with the slot on the chassis.

9.1.4 Ultra-Slim Desktop Access Panel

1. Prepare the computer for disassembly.
2. Remove the two screws that secure the access panel to the chassis.
3. Slide the access panel toward the rear and then remove from the chassis.

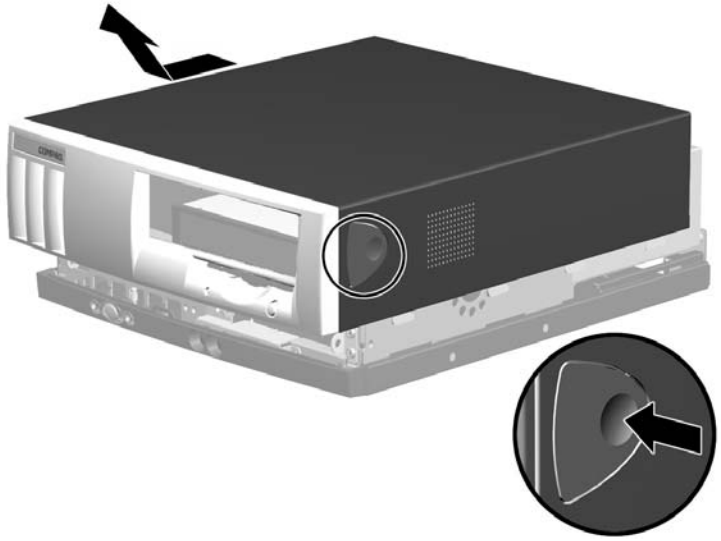


To replace the access panel reverse the previous steps.

9.1.5 Computer Cover Models

Removal Using Buttons

1. Prepare the computer for disassembly.
2. Press in the button on each side of the front bezel to release the release cover latches.
3. As you slide the computer cover forward, release the buttons and allow them to return to the original position, then lift the cover up and off the unit.

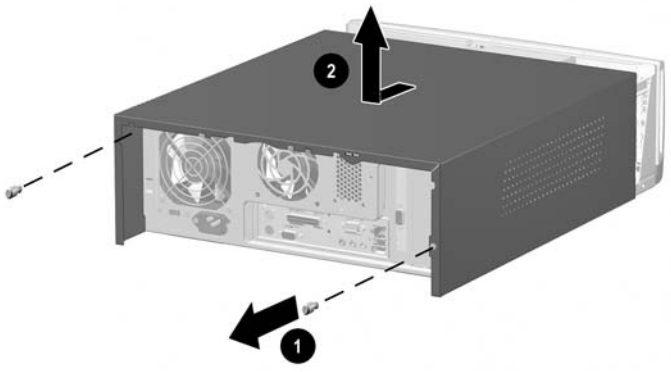


SFF, T1 shown

To replace the computer cover, reverse the removal procedure.

Removal Using Thumbscrews

1. Prepare the computer for disassembly.
2. Loosen the two captive thumbscrews ❶ that secure the cover to the computer chassis.
3. Slide the cover back about 1 inch (2.5 cm), then lift it up ❷ and off the unit.

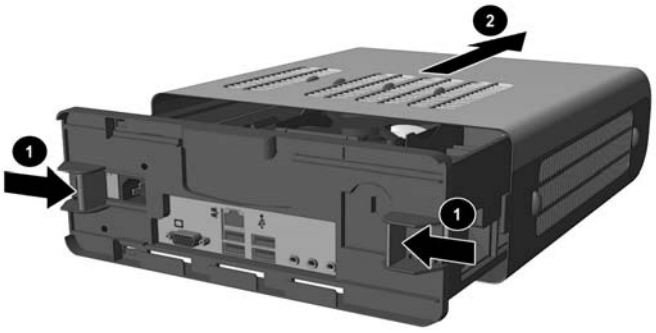


DT shown

To replace the computer cover, reverse the removal procedure.

Removal Using Rear Latches

1. Prepare the computer for disassembly.
2. Slide the two green latches ❶ on the rear of the chassis towards the center of the computer.
3. Hold the rear panel in place while pulling the cover away ❷ from the front of the chassis.



e-PC shown

To replace the computer cover, reverse the removal procedure.

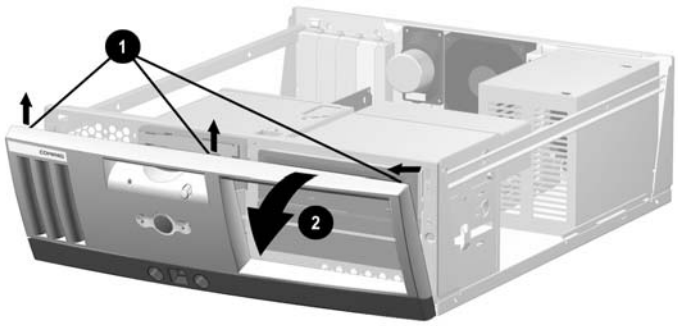
CAUTION: After inserting the chassis into the hood assembly you must ensure that the two green release levers are in their original locked (outward) position. Failure to lock the cover in place could allow the chassis to slide out of the cover assembly.

9.2 Front Bezel and Related Components

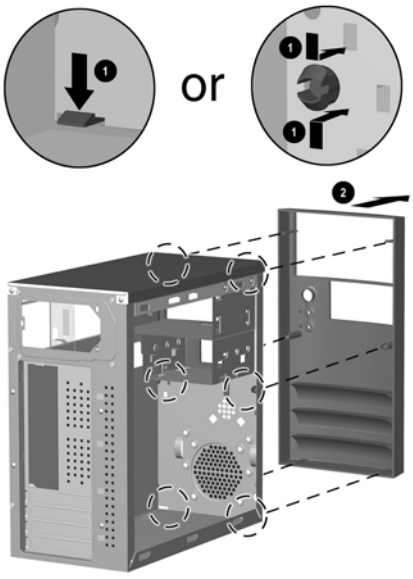
9.2.1 Front Bezel Removal - Tabs

Front bezels are generally connected to the chassis using tabs. However, different computers may have different tab locations and slightly different bezel removal procedures.

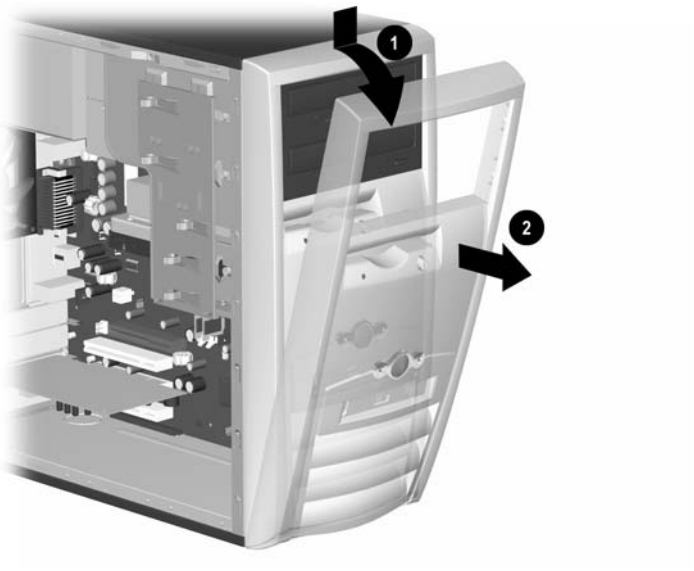
1. Prepare the computer for disassembly.
2. Remove the computer cover.
3. Press the release tabs ❶ to disconnect the bezel from the chassis.
4. Pull the front bezel away from the chassis ❷ to remove it from the unit.



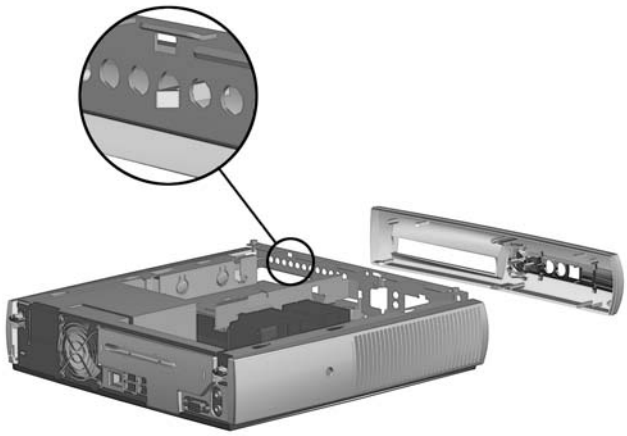
DT shown



Microtower, Type 1 shown



Microtower Type 2 shown



Ultra-Slim Desktop shown

When replacing the front bezel, ensure that the bottom hinge points are properly placed in the chassis before rotating the front bezel back into its original position.

To replace the front bezel, reverse the removal procedure.

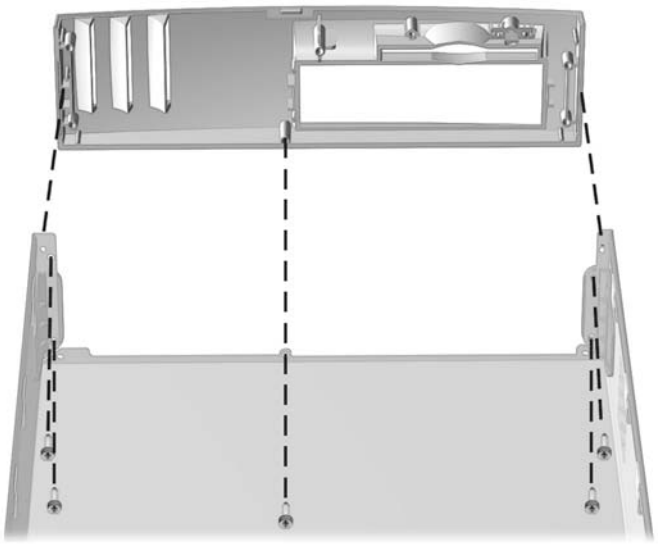
9.2.2 Front Bezel Removal - Screws

Front bezels may be attached to computer covers using screws; however, different computers may have different screw locations and counts.

1. Prepare the computer for disassembly.
2. Remove the computer cover.
3. Lay the cover on its back on a protected surface.
4. Remove the screws that connect the front bezel to the computer cover.

When removing the screws, the computer cover release latches will also come loose. Be sure to note the orientation of the metal clips (grounding straps) that are secured to both the bezel and the computer cover. These clips must be properly aligned when they are reinstalled.

5. Remove the bezel from the computer cover.



SFF, T1 shown

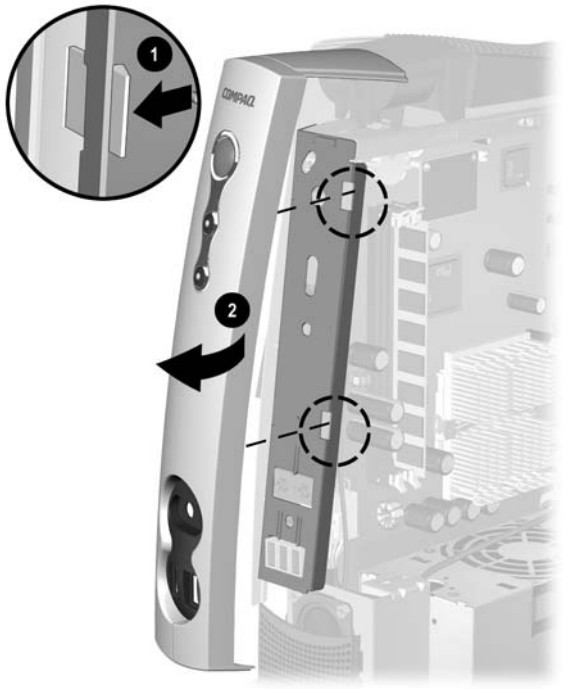
To replace the bezel, reverse the removal procedures.

When replacing the front bezel, be sure to replace the grounding straps.

9.2.3 iPAQ Front and Top Bezels

Front Bezel

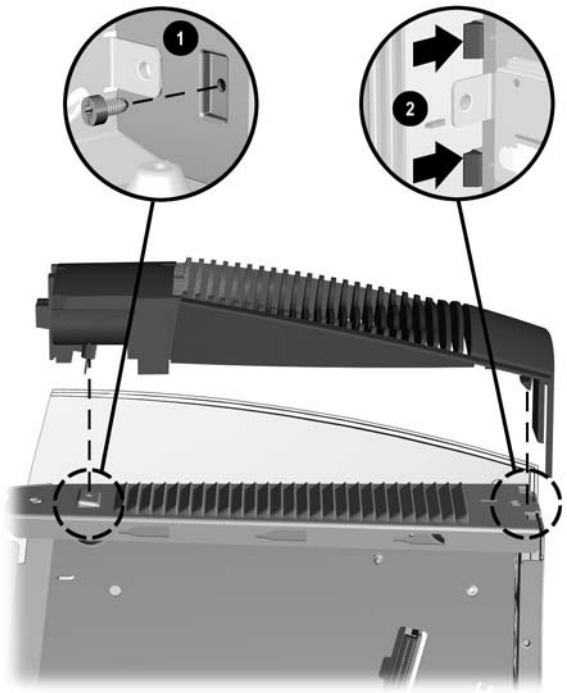
1. Prepare the computer for disassembly.
2. Eject the drive from the MultiBay.
3. Remove both outer access panels.
4. Remove the inner access panel.
5. Press the two tabs on the inside of the front bezel to release them ❶, then rotate the bezel to the left to release the remaining two tabs ❷.



To replace the front bezel, reverse the previous steps.

Top Bezel

1. Prepare the computer for disassembly.
2. Remove the right access panel.
3. Remove the inner access panel.
4. Remove the front bezel.
5. Remove the screw that secures the front of the top bezel to the chassis ❶.
6. Grasp the top bezel near the front and lift it up while at the same time releasing the two tabs at the back ❷.

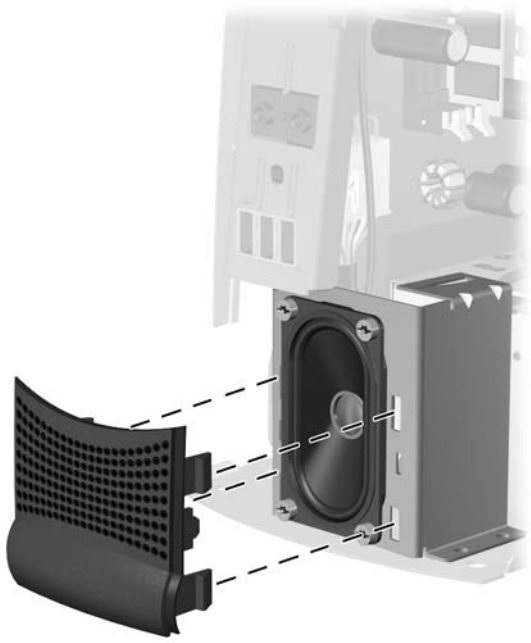


To replace the top bezel, reverse the previous steps.

Speaker Grill

1. Prepare the computer for disassembly.
2. Eject the drive from the MultiBay.
3. Remove the two outer access panels.
4. Press the four tabs on each side of the speaker bezel to release them from the chassis, then pull the speaker bezel from the chassis.

The top edge of the speaker bezel nests under the front bezel and it may be necessary to tilt the bottom the speaker bezel up to clear the obstruction.



To replace the speaker grill, reverse the previous steps.

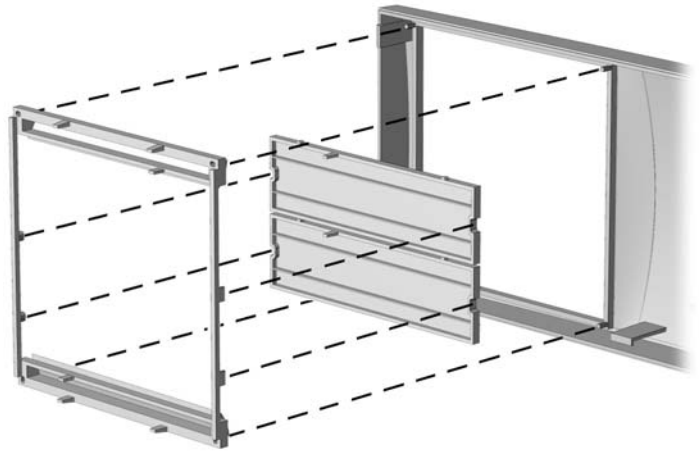
9.2.4 Subpanel and Bezel Blanks—CMT

The subpanel and bezel blanks must be removed from the front bezel if you are installing a mass storage device for the first time, or if you are converting the unit from a desktop to a minitower configuration or from a minitower to a desktop. See Section 9.8 in this book for more information on changing unit configuration.

1. Prepare the computer for disassembly.
2. Lay the computer down on its large base for greater stability.
3. Remove the access panel.
4. Remove the front bezel.
5. Pull on the subpanel to remove it from the inside of the front bezel.

CAUTION: Hold the subpanel straight when you pull it away from the front bezel. Pulling at an angle could damage the pins that align the subpanel within the front bezel.

6. Gently push on the bezel blanks to remove them from the subpanel.



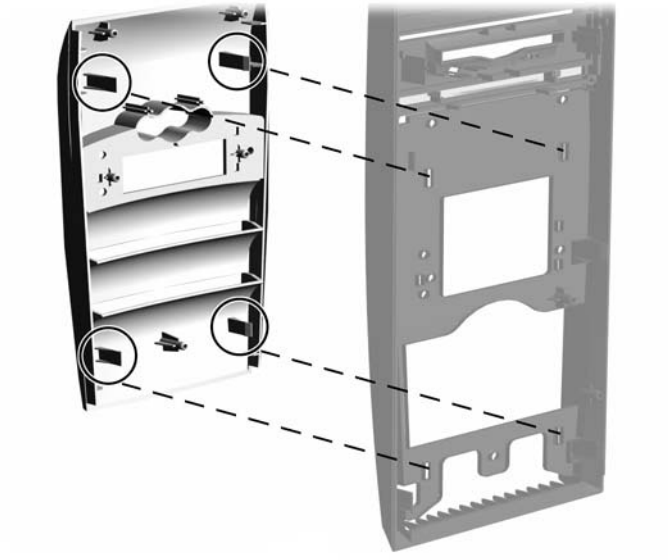
CAUTION: When replacing the subpanel, ensure that the aligning pins and any remaining bezel blanks are in the proper orientation to prevent damage to the alignment pins.

The subpanel has markings on it to facilitate installation.

9.2.5 CMT Front Bezel Assembly

Front Bezel

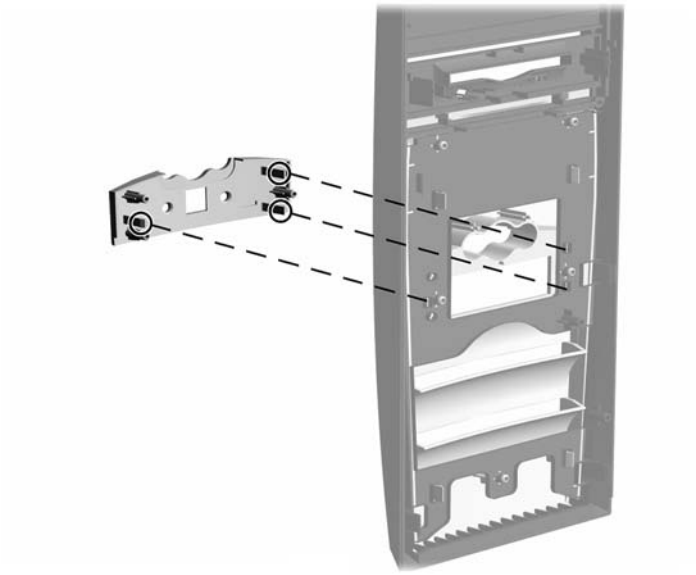
1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Remove the front bezel assembly.
4. Press the four tabs on the four corners of the bezel front to release bezel front from the bezel base.
5. Remove the bezel front from the bezel base.



To reassemble the front bezel assembly, reverse the disassembly procedure.

USB Panel

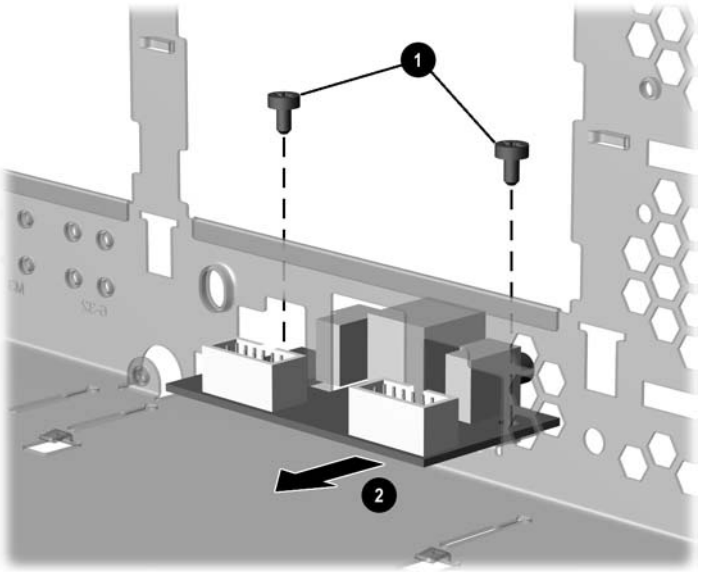
1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Remove the front bezel assembly.
4. Depress the three tabs that connect the USB panel to the front bezel.



To replace the USB panel, reverse the removal procedure.

Front Bezel USB/Audio Card—CMT and DT

1. Prepare the computer for disassembly.
2. If this is a CMT, lay the computer down on its large base for greater stability.
3. Remove the access panel (CMT) or computer cover (DT).
4. Remove the front bezel assembly.
5. Disconnect the two cables that are attached to the USB/Audio card.
6. Remove the two screws that secure the card to the chassis ❶.
7. Remove the card from the chassis by first sliding it into the chassis ❷ and then removing it through the large chassis opening above the card's mounting location.



DT shown

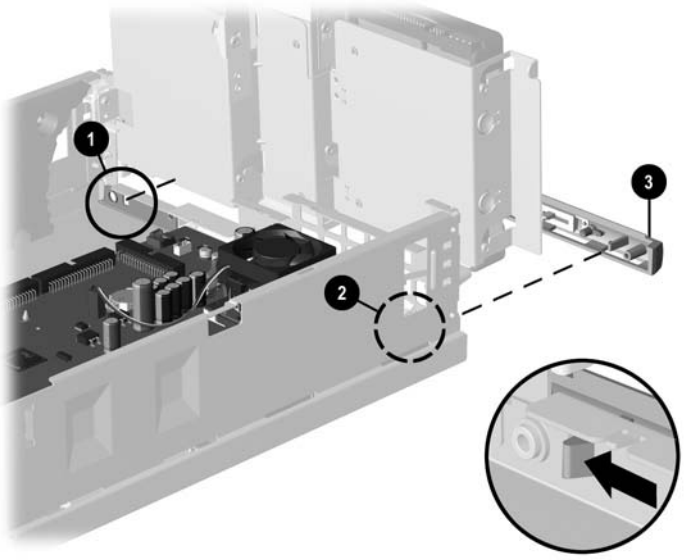
To replace the card, reverse the removal procedures. If necessary, replace the front bezel insert with the appropriate insert to allow access to the new ports.

9.3 Front Trim/Panel Plate

9.3.1 Small Form Factor, SFF, T1

The Small Form Factor has a removable front trim that is located below the front bezel. The front trim is connected to the chassis using tabs. However, different computers may have different tab locations and slightly different trim removal procedures.

1. Prepare the computer for disassembly.
2. Remove the computer cover.
3. Rotate the drive cage to its upright position.
4. Press the left tab that connects the front trim to the chassis ❶.
5. Press the right tab that connects the front trim to the chassis ❷.
6. Remove the front trim from the computer ❸.

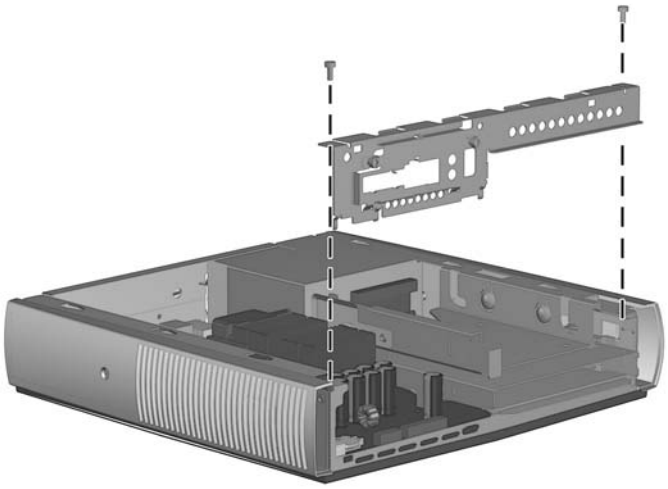


SFF, T1 shown

To replace the front trim, reverse the removal procedures.

9.3.2 Ultra-Slim Desktop

1. Prepare the computer for disassembly.
2. Remove the computer cover.
3. Remove the front bezel.
4. Disconnect the power switch and USB cables that are connected to the system board.
5. Remove two screws that secures the front panel plate to the chassis.
6. Remove the front panel plate from the chassis.



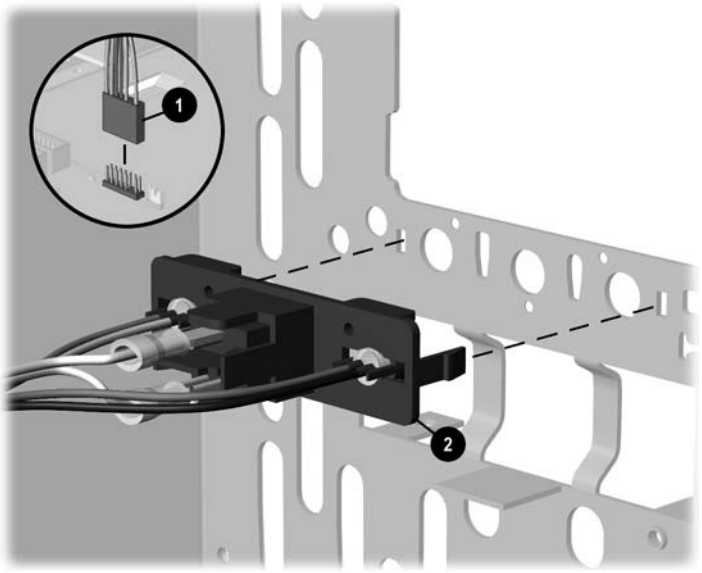
Ultra-Slim Desktop Shown

To replace the front panel plate, reverse the removal procedure.

9.4 Power Switches

9.4.1 Convertible Minitower

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Remove the front bezel.
4. Move/remove any components necessary to gain access to the power switch.
5. Disconnect the Power/LED cable from the system board ❶.
6. Push the release tab ❷ toward the drive bays, then remove the power switch assembly from the chassis.



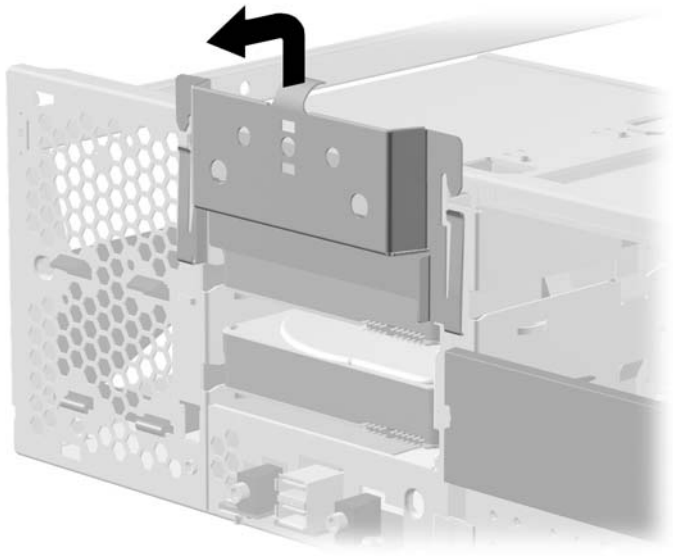
CMT shown

To install the new power switch, reverse the above procedure. Ensure that the orienting pins are properly aligned with the locating holes before seating the switch assembly. The switch is fully seated when it snaps into place.

To install a Power/LED cable, reverse the above procedure. The Power/LED connector is keyed to ensure proper installation.

9.4.2 Desktop

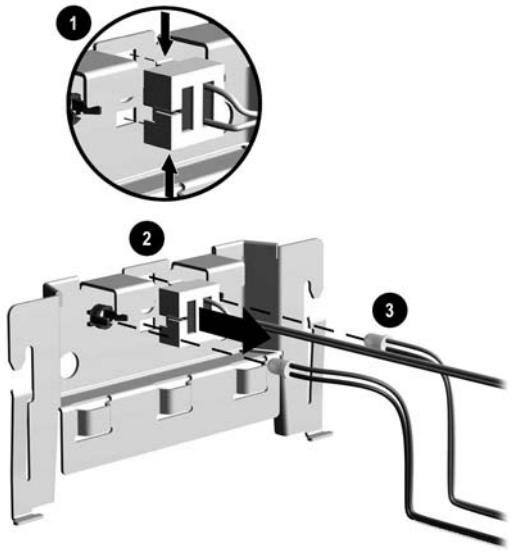
1. Prepare the computer for disassembly.
2. Remove the computer cover.
3. Remove the front bezel.
4. Lift up on the power switch bracket, then pull it straight out of the chassis.



DT shown

5. Disconnect the power switch cable from the system board.
6. Remove the hard drive from the chassis before trying to replace the power switch cable assembly.

7. To remove the power switch cable, push the two LEDs out of the bracket and then squeeze the retainers on the switch to release it from the bracket.



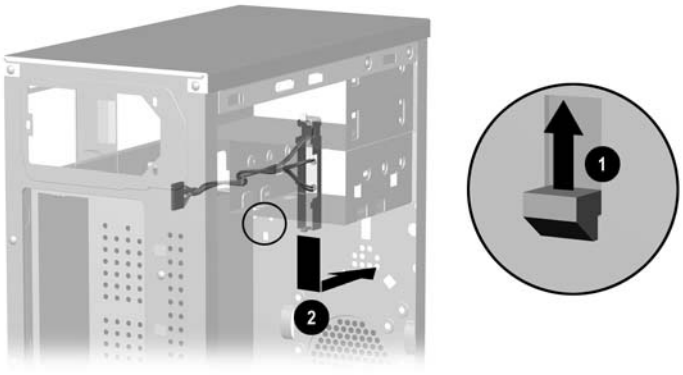
DT Power switch removal

To replace the power switch assembly, reverse the above procedures.

When replacing the power switch, make sure that the power switch LED cable assembly is routed under the hard drive.

9.4.3 Microtower, Type 1

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Remove the front bezel.
4. Push the power button assembly upward ❶ to disengage its lower tab from the chassis.
5. Pull the power button assembly down ❷ to disengage its upper tab from the chassis.
6. Remove the assembly from the chassis.

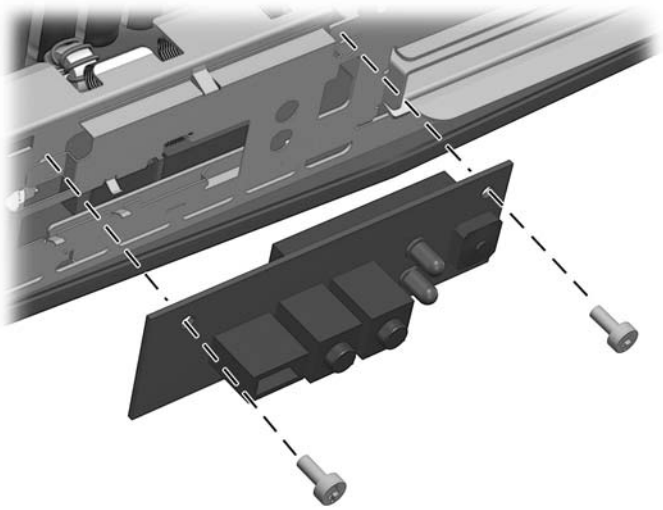


Microtower, Type 1 shown

To replace the power switch assembly, reverse the above procedures.

9.4.4 Ultra-Slim Desktop

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Remove the front bezel.
4. Disconnect the power switch cable from the system board.
5. Remove the front panel plate with front panel board and power switch attached from the chassis.
6. Remove two screws that secures the front panel board to the front panel plate.
7. Remove the front panel board with the power switch assembly from the front panel plate.



Ultra-Slim Desktop shown

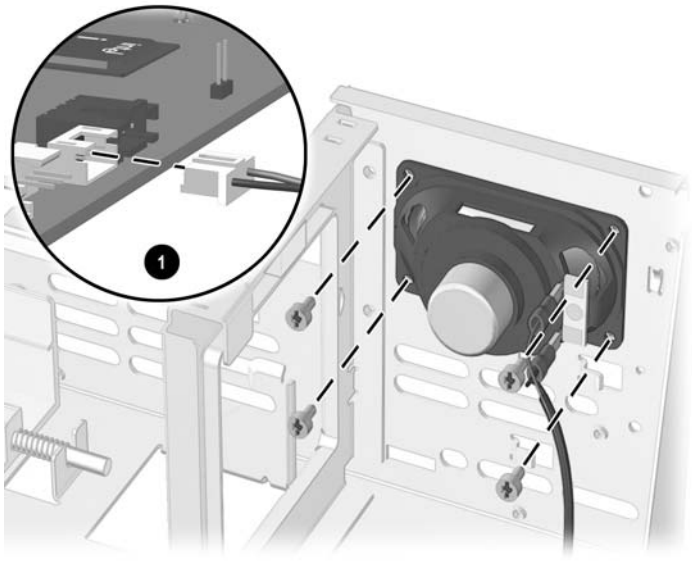
To replace the front panel plate with front panel board and power switch assembly, reverse the procedure.

9.5 Speaker

9.5.1 DT or CMT Speaker

The speaker in the DT or CMT is secured to either the front or the rear chassis with two or four screws.

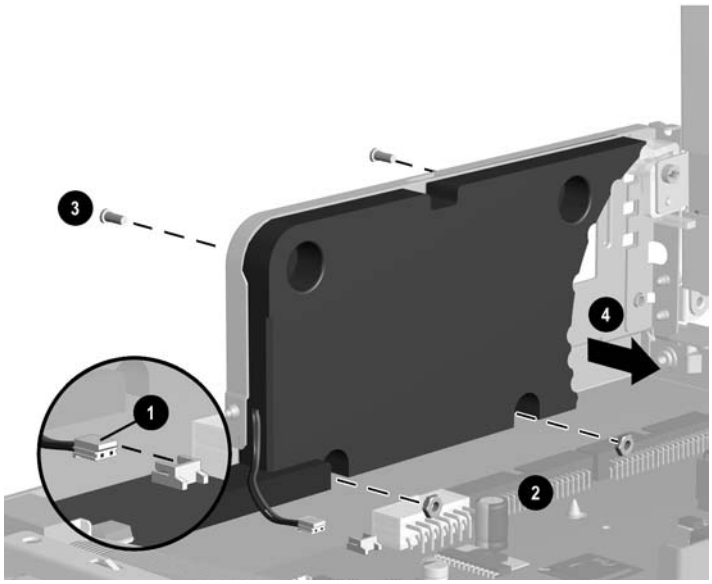
1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Move/remove any components (such as expansion cards or board guide) necessary to gain access to the speaker.
4. Disconnect the speaker wire from the system board ❶.
5. Remove the four screws that secure the speaker to the chassis.
6. Remove the speaker.



To install the speaker, reverse the removal procedure.

9.5.2 Small Form Factor Speaker

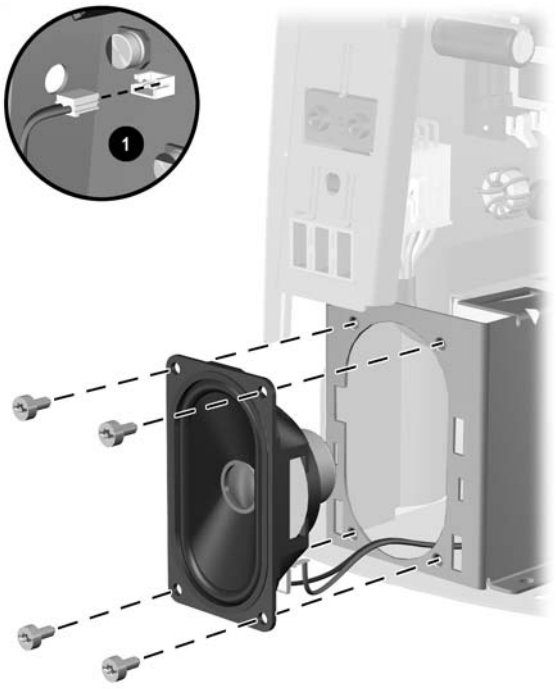
1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Move/remove any components necessary to gain access to the speaker.
4. Disconnect the speaker wire from the system board connector ❶.
5. Use a 5/16” socket wrench to remove the two nuts, located on the inside of the speaker, that secure the speaker to the chassis ❷.
6. Remove the two screws, located on the outside of the speaker, that secure the speaker to the chassis ❸.
7. Remove the speaker ❹.



To install the speaker, reverse the removal procedures.

9.5.3 iPAQ Speaker

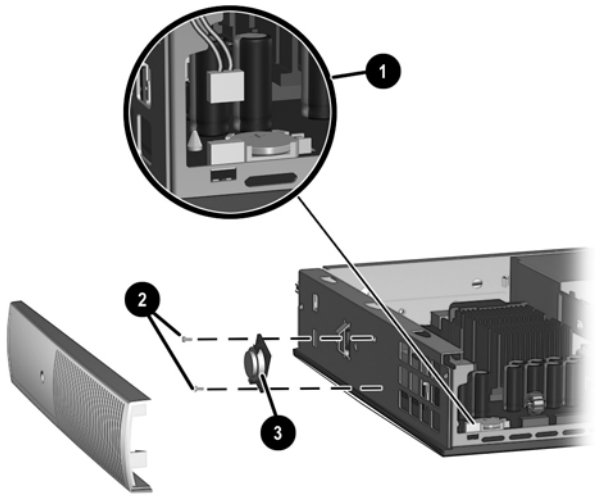
1. Prepare the computer for disassembly.
2. Remove both the left and right outer access panels.
3. Remove the inner access panel.
4. Remove the speaker grill.
5. Disconnect the audio cable from the system board ❶.
6. Remove the four screws from the front of the chassis that secure the speaker to the chassis.
7. Remove the speaker from the chassis.



To replace the speaker, reverse the previous steps making sure that the wire leads on the speaker are pointing down towards the bottom of the chassis.

9.5.4 Ultra-Slim Desktop Speaker

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Release the (front and rear) tabs to remove the left side panel.
4. Disconnect the speaker wire ❶ from the system board.
5. Remove two screws ❷ that secure the speaker to the chassis.
6. Remove the speaker ❸.



To install the speaker, reverse the removal procedure.

9.6 iPAQ Legacy Module

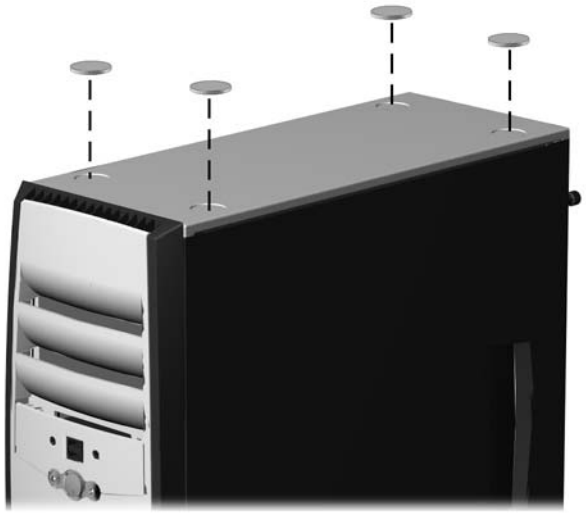
1. Prepare the computer for disassembly.
2. Pull the Legacy Module from the connector on the I/O panel.

To install the Legacy Module, align the Legacy Module over the connector on the I/O panel and snap into place.

9.7 Feet

Four (4) rubber feet are mounted to the chassis, as shown below. No parts have to be removed to access the feet. The replacement feet have an adhesive surface and are shipped with a protective backing in place. Remove the backing from the feet before installation.

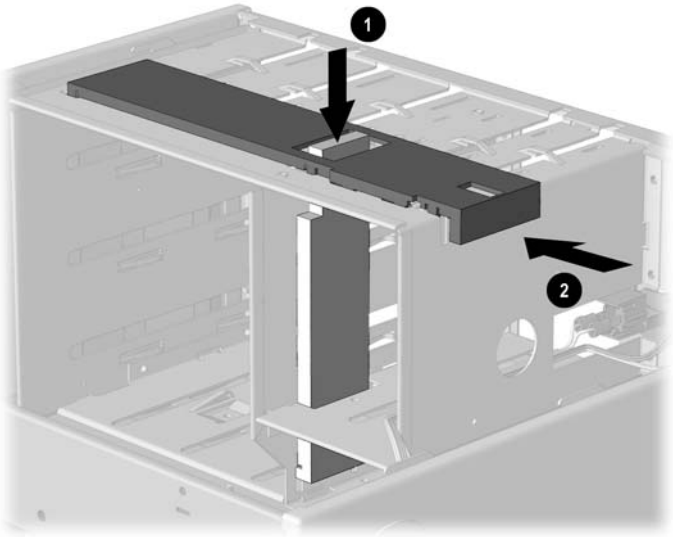
If necessary, remove the old feet and remove any adhesive residue from the chassis before attaching the replacements.



CMT shown

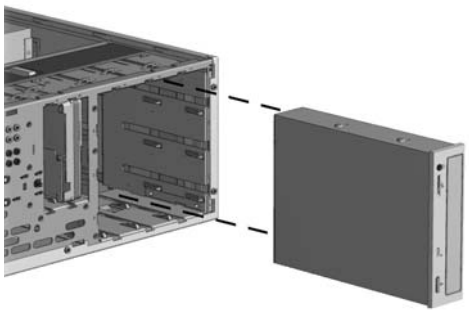
9.8 Converting a Desktop to a Minitower

1. Prepare the computer for disassembly.
2. Lay the computer down on its large base for greater stability.
3. Remove the access panel.
4. Remove the front bezel.
5. Remove the drives from the 5.25-inch drive bays by pressing drivelock ❶ for desktop configuration, drivelock ❷ for minitower configuration.

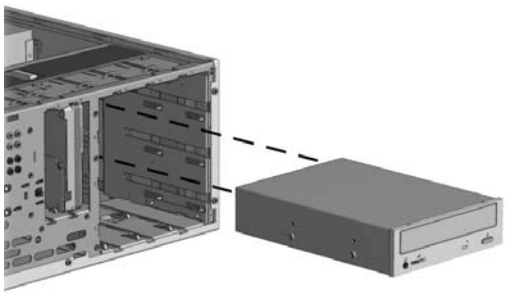


6. Rotate the drives 90 degrees, then reinstall them into the drive bays.

The diskette drive should always be placed in bay number 3, the bay nearest the internal 3.5-inch drives, for proper placement within the chassis.



Minitower configuration



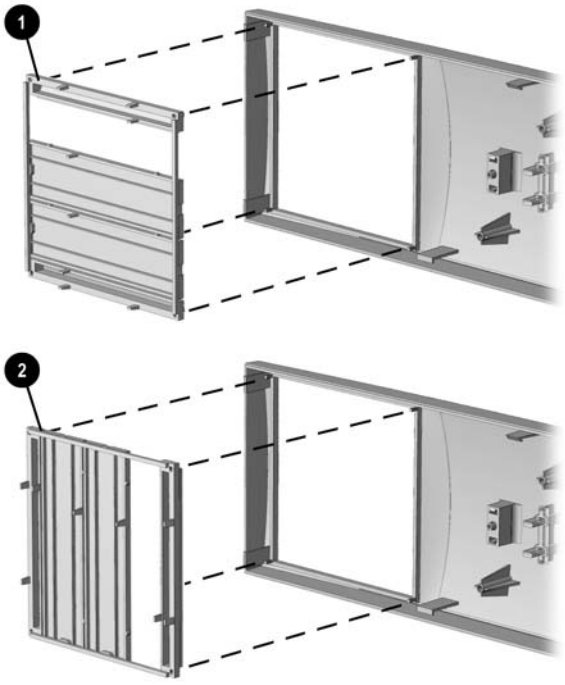
Desktop configuration

The use of unnecessary force may result in damage to the drives.

7. Reconnect the power, signal, and audio cables to the drives.

8. Remove the subpanel and rotate it 90 degrees in a clockwise direction.

CAUTION: Hold the subpanel straight when you pull it away from the front bezel. Pulling the subpanel away at an angle could damage the pins that align it within the front bezel.

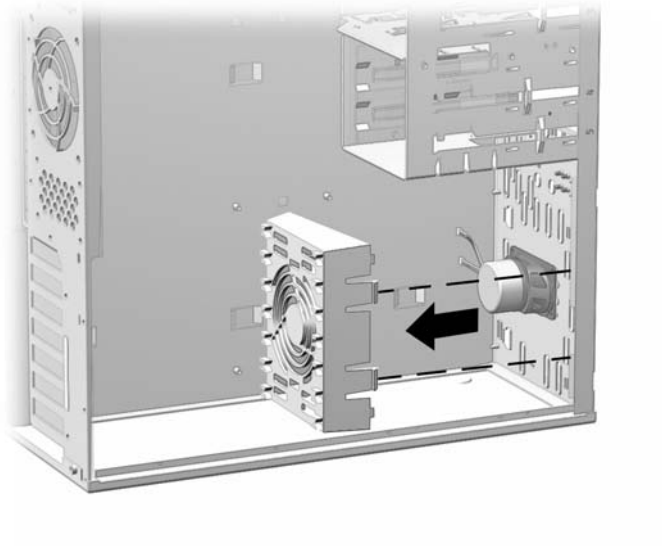


❶ = Desktop configuration; ❷ = Minitower configuration

9. Replace the subpanel, front bezel, and the computer access panel.
10. Rotate the Compaq nameplate 180 degrees so that it can be easily read when looking at it from the front of the computer.
11. Reassemble the computer.

9.9 Board Guide

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Move/remove any components necessary to gain access to the board guide.
4. Remove any full-length expansion boards.
5. Push down on the two tabs on the side of the board guide.
6. While holding the tabs down, remove the guide from the chassis.

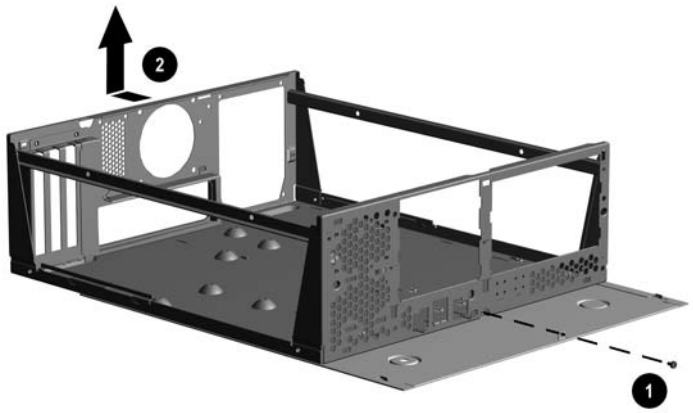


Convertible minitower shown

To replace the board guide, reverse the above procedure.

9.10 Desktop - Removing Chassis from Basepan

1. Prepare the computer for disassembly.
2. Remove the computer cover.
3. Remove the front bezel.
4. Remove the screw that connects the chassis to the basepan ❶.
5. Slide the chassis toward its rear to disconnect it from the tabs on the basepan, then lift the chassis off of the basepan ❷.



To install the basepan, reverse the disassmbly procedures.

10

Removal and Replacement Procedures Expansion Cards and Memory

For an overview of the different chassis discussed in this chapter, refer to Chapter 6 “Identifying the Chassis, Routine Care, and Disassembly Preparation.” The chassis are: Convertible Minitower (CMT), Microtower, T (uT), Desktop (DT), Small Form Factor (SFF), Ultra-Slim Desktop, iPAQ, and the e-PC.

CAUTION: When the computer is plugged into an AC power source, voltage is always applied to the system board. You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

10.1 Memory Expansion

10.1.1 Intel 815e

The memory sockets on the Intel 815e chipset–based system board can be populated with industry-standard DIMMs. These memory module slots are populated with at least one preinstalled memory module. To achieve the maximum memory support, you may be required to replace the preinstalled DIMM with a higher capacity DIMM.

For proper system operation, the DIMMs must be industry-standard 168-pin, unbuffered PC100- or PC133- compliant SDRAM DIMMs, depending on the model. The SDRAM DIMMs must support CAS Latency 2 or 3 (CL = 2 or CL = 3). They must also contain the mandatory Joint Electronic Device Engineering Council (JEDEC) Serial Presence Detect (SPD) information. DIMMs constructed with x4 SDRAM (16 ICs per side) are not supported; the system will not start using unsupported DIMMs.

The Intel 815e chipset supports both PC100 and PC133 SDRAM DIMMs. PC133 DIMMs should be used for optimal performance. If both PC100 and PC133 SDRAM DIMMs are installed in a computer, the system memory will run at the lower, 100 MHz speed. Some configurations of PC133 SDRAMs may run at 100 MHz instead of 133 MHz.

CAUTION: Memory module sockets have gold metal contacts. When upgrading the memory, it is important to use memory modules with gold metal contacts to prevent corrosion and/or oxidation resulting from having incompatible metals in contact with each other.

10.1.2 Intel 845

The memory sockets on the Intel 845 chipset-based system board can be populated with industry-standard DIMMs. These memory module slots are populated with at least one preinstalled memory module. To achieve the maximum memory support, you may be required to replace the preinstalled DIMM with a higher capacity DIMM. For proper system operation, the DIMMs must be industry-standard 168-pin, unbuffered PC133-compliant SDRAM DIMMs, depending on the model. The SDRAM DIMMs must support CAS Latency 2 or 3 (CL = 2 or CL = 3). They must also contain the mandatory Joint Electronic Device Engineering Council (JEDEC) Serial Presence Detect (SPD) information. DIMMs constructed with x4 SDRAM are not supported; the system will not start using unsupported DIMMs.

CAUTION: Some models support ECC memory and some support non-ECC memory. Systems that do support ECC do **not** support mixing ECC and non-ECC memory. Doing so will cause the system to blink the NUMLOCK LED on the keyboard continuously and, if a speaker is installed in the system, there will be a short beep followed by 2 long beeps. In addition, the system will not boot the operating system.

10.1.3 DIMM Installation

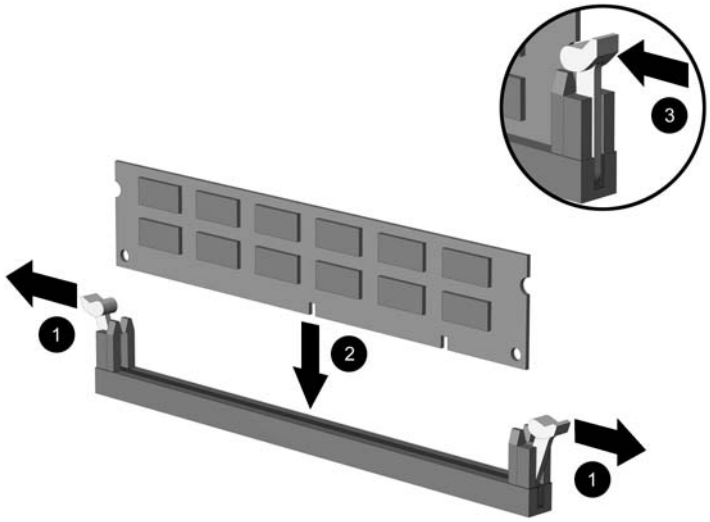
1. If the computer has a locked Smart Cover Lock, use Computer Setup to unlock the lock and disable the Smart Cover Sensor.
2. Shut down the operating system properly and turn off the computer and any external devices; then, disconnect the power cord from the power outlet.
3. Remove the access panel and locate the memory module sockets.

WARNING: To reduce risk of personal injury from hot surfaces, allow the internal system components to cool before touching.

4. Open both latches of the memory module socket ❶, and insert the memory module into the socket ❷.

   Begin by installing a module into the socket nearest the preinstalled module, and install the modules following the numerical order of the sockets.

   A memory module can be installed only one way. Match the notch on the module with the tab on the memory socket. Push the module down into the socket, ensuring that the module is fully inserted and properly seated ❸.



When the computer starts up, it will recognize the system memory upgrades and automatically reconfigure the computer.

Do not exceed 1 GB of memory on a system. Exceeding that limit will cause the system to halt.

10.2 Expansion Card Cage

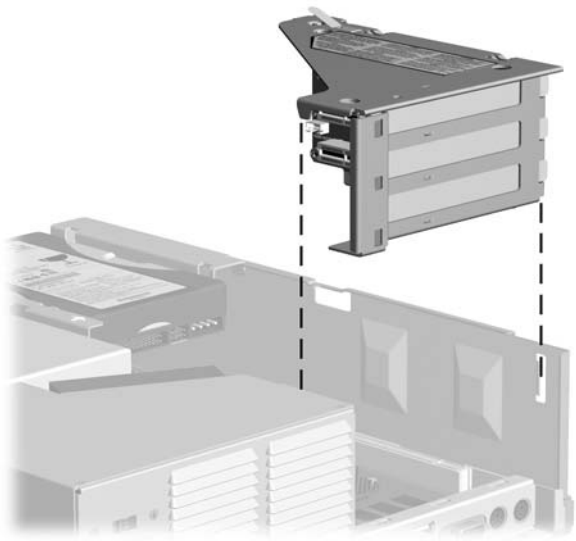
The two small form factor chassis contain virtually the same components; however, the orientation of components is mirrored between the two chassis.

The number of expansion card slots may vary.

10.2.1 Removing an Expansion Card Cage

Expansion card cage location and removal procedures may vary.

1. Prepare the computer for disassembly.
2. Remove the computer cover.
3. Pull the expansion card cage straight up to remove it from the chassis.



SFF, T1 shown

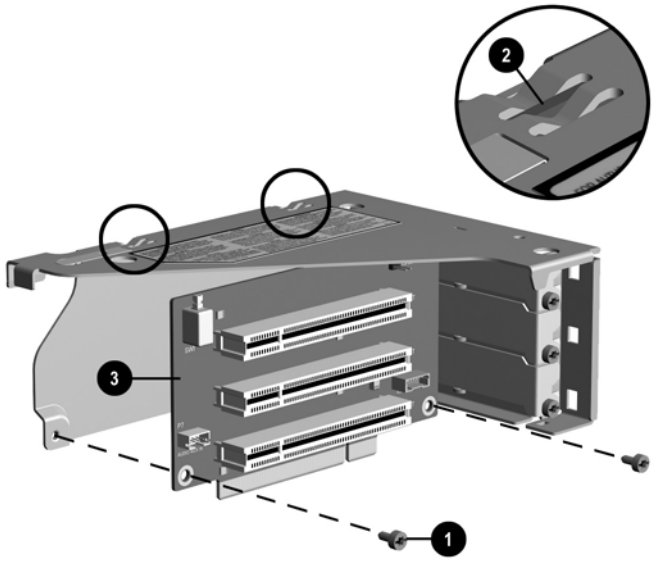
To replace the expansion card cage, reverse the removal procedures.

If the expansion card cage connects to the power supply ensure that the tab on the brace latches into the slot on the side of the power supply when reinstalling the expansion card cage.

10.2.2 Riser Board

Riser board removal procedures may vary slightly.

1. Prepare the computer for disassembly.
2. Remove the computer cover.
3. Remove the expansion card cage.
4. Remove any expansion cards.
5. Disconnect any cables from the riser board.
6. Remove the screws that secure the riser board to the expansion card cage ❶.
7. Slide the board down slightly so it clears the guide slots on the top of the expansion card cage ❷.
8. Remove the riser board from the expansion card cage ❸.



SFF, T1 shown

To replace the riser board, reverse the removal procedures.

10.3 Expansion Cards—with Retaining Bracket

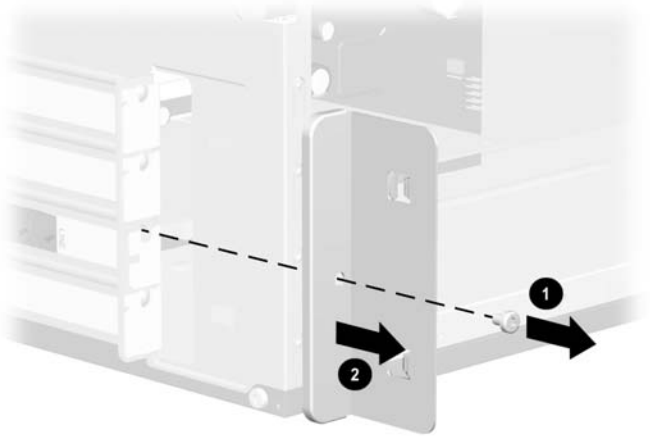
1. Prepare the computer for disassembly.
2. Remove the access panel.

If installing an expansion card, skip to step 8.

3. To remove an expansion card, disconnect any cables attached to the expansion card.
4. Remove the screw ❶ from the retaining bracket and lift the bracket ❷ from the chassis.
5. Hold the card at each end and carefully rock it back and forth until the connectors pull free from the socket. Be sure not to scrape the card against other components.
6. Store the card in anti-static packaging.
7. Install an expansion slot cover or new expansion card to close the open slot.

If installing an expansion card, skip to step 9.
If not installing a new expansion card, skip to step 10.

8. Remove the expansion slot cover by first removing the retaining bracket.
9. Slide the expansion card into the expansion socket and press it firmly into place.



Microtower, Type 2 chassis shown

When installing an expansion card, make sure you press firmly on the card so that the entire connector seats properly in the expansion card socket.

10. Replace the retaining bracket and replace the screw to secure it in place.
11. Replace the access panel.
12. Connect external cables to the installed card, if needed.
13. Reconfigure the computer, if necessary.

10.4 Expansion Cards—with Retaining Screw

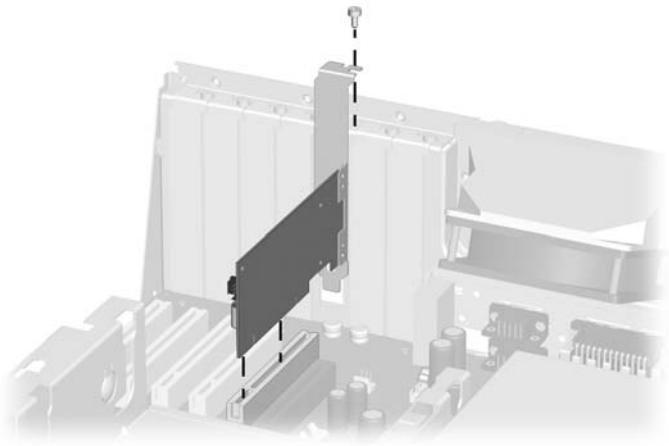
1. Prepare the computer for disassembly.
2. Remove the access panel.

If installing an expansion card, skip to step 8.

3. To remove an expansion card, disconnect any cables attached to the expansion card.
4. Remove the screw at the top of the expansion slot.
5. Hold the card at each end and carefully rock it back and forth until the connectors pull free from the socket. Be sure not to scrape the card against other components.
6. Store the card in anti-static packaging.
7. Install an expansion slot cover or new expansion card to close the open slot.

If installing an expansion card, skip to step 9.
If not installing a new expansion card, skip to step 10.

8. Remove the expansion slot cover.
9. Slide the expansion card into the expansion socket and press it firmly into place.



When installing an expansion card, make sure you press firmly on the card so that the entire connector seats properly in the expansion card socket.

10. Replace the screw at the top of the expansion slot.
11. Replace the access panel.
12. Connect external cables to the installed card, if needed.
13. Reconfigure the computer, if necessary.

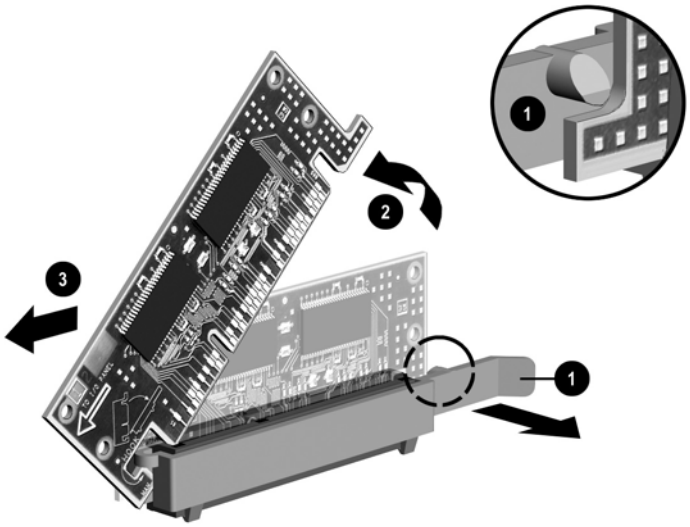
10.5 Graphics Sockets with Retention Mechanisms

The AGP expansion socket may come with a retention mechanism installed around it to hold the graphics cards securely in place. There are two different types of retention mechanisms that may be installed around the AGP expansion socket.

10.5.1 GPA/AIMM) Card with a Type 1 Retention Mechanism

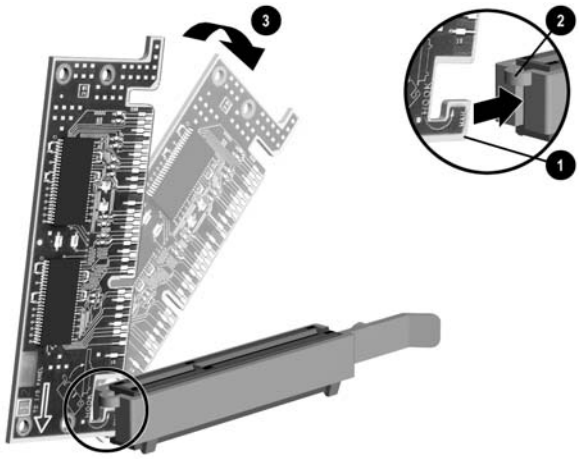
To remove a Graphics Performance Accelerator (GPA) card or an AGP Inline Memory Module (AIMM) card using the the Type 1 retention mechanism proceed as follows:

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Pull the arm on the right side of the retention mechanism ❶.
4. At the same time, rotate the front of the GPA/AIMM card up until it is at a 45 degree angle ❷.
5. Remove the card from the expansion socket ❸.



Installing a GPA/AIMM Card

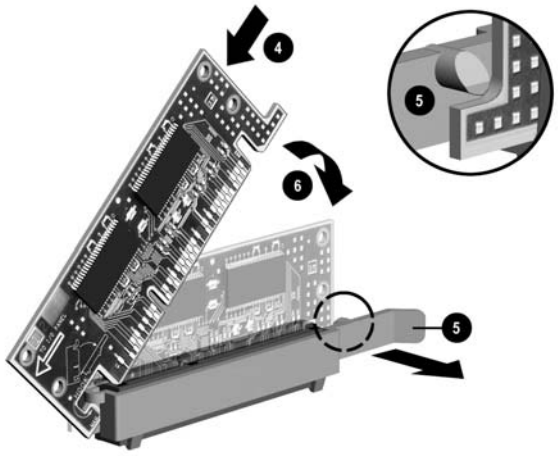
1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Insert the hook ❶ on the left side of the GPA/AIMM card under the loop ❷ on the left side of the retention mechanism.
4. Rotate the right side of the card down until it is at a 45 degree angle ❸.



5. With the GPA/AIMM card at a 45 degree angle, slide the card back towards the back of the expansion socket ❹ until the fingers on the bottom of the card line up properly with the connectors in the expansion socket.

CAUTION: The fingers on the bottom of the GPA/AIMM card must be properly aligned with the expansion slot during installation. Misalignment may result in damage to the card or the AGP connector.

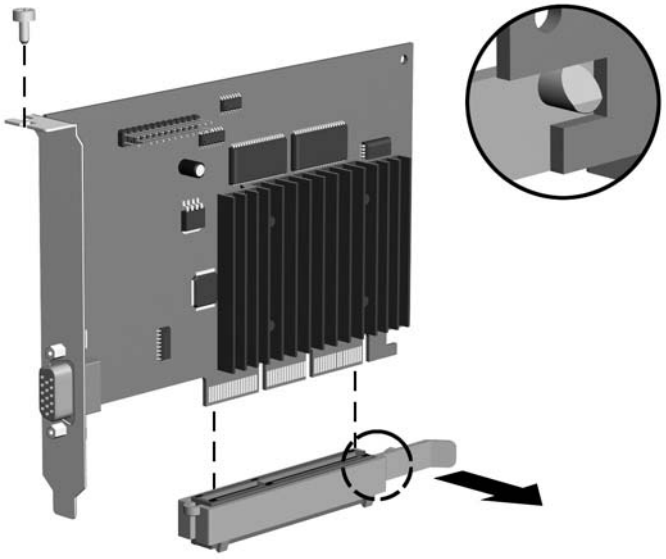
6. While pulling the arm on the right side of the retention mechanism ❺, rotate the card down into the expansion socket until seated ❻.



10.5.2 AGP Card with a Type 1 Retention Mechanism

To remove an AGP Card using a type 1 retention mechanism proceed as follows:

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Remove the screw at the top of the expansion slot.
4. Pull the arm on the right side of the retention mechanism.
5. Pull the card straight up to remove it from the expansion socket.



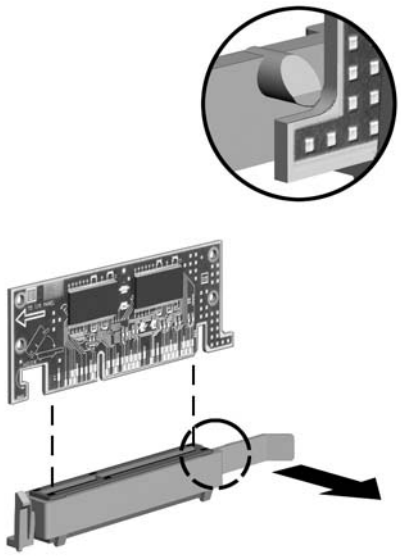
To install the graphics card, reverse the above procedures.

Some models may not require a retaining screw.

10.5.3 GPA/AIMM Card with a Type 2 Retention Mechanism

To remove a GPA/AIMM Card using a type 2 retention mechanism proceed as follows:

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Pull the arm on the right side of the retention mechanism.
4. Pull the card straight up to remove it from the expansion socket.

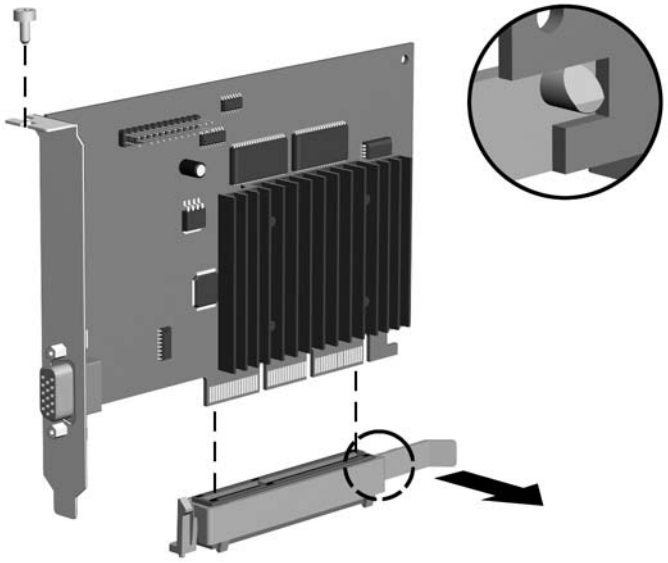


To install the graphics card, reverse the above procedures.

10.5.4 AGP Card with a Type 2 Retention Mechanism

To remove an AGP Card using a type 2 retention mechanism proceed as follows:

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Remove the screw at the top of the expansion slot.
4. Pull the arm on the right side of the retention mechanism.
5. Pull the card straight up to remove it from the expansion socket.

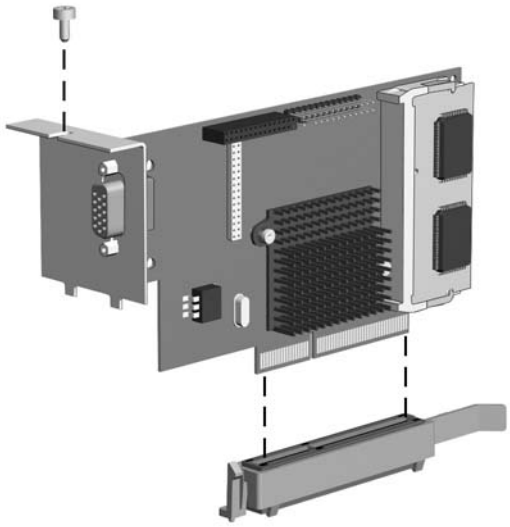


To install the graphics card, reverse the above procedures.

Some models may not require a retaining screw.

10.5.5 AGP Card with Type 1 or Type 2 Retention Mechanism

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Remove the screw at the top of the expansion slot.
4. Remove the AGP graphics card as you would any PCI expansion card.

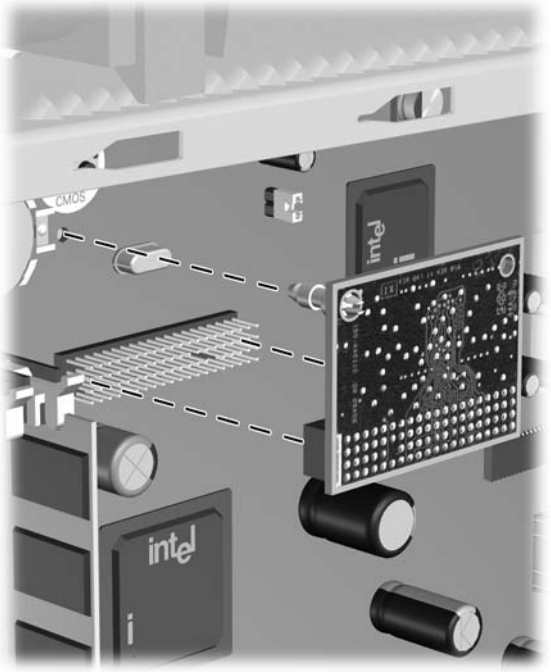


To install the graphics card, reverse the above procedures.

Some models may not require a retaining screw.

10.5.6 iPAQ Graphics Memory Cache

1. Prepare the computer for disassembly.
2. Remove the right access panel.
3. Remove the inner access panel.
4. Pull straight up on the cache module to disengage it from the socket on the system board.



To install the cache module, reverse the above procedures. The cache module has a large pin on one corner that ensures proper orientation.

11

Removal and Replacement Procedures System Board with Major Components

For an overview of the different chassis discussed in this chapter, refer to Chapter 6 “Identifying the Chassis, Routine Care, and Disassembly Preparation.” The chassis are: Convertible Minitower (CMT), Microtower, T (uT), Desktop (DT), Small Form Factor (SFF), Ultra-Slim Desktop, iPAQ, and the e-PC.

CAUTION: When the computer is plugged into an AC power source, voltage is always applied to the system board. You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

11.1 Heatsink and Processor

11.1.1 Separating the Heatsink/Processor Assembly

1. Turn off and unplug the computer.
2. Remove the computer cover or access panel, and rotate the computer if necessary to ensure that the system board is parallel to the work table. On the e-PC, the system board must be removed to access the heatsink/processor assembly.
3. Tap the heatsink to check its temperature. If it is cool enough to handle, then proceed.
4. Release the heatsink from the socket. Depending on system type, the heatsink may be retained by retaining clip(s), or by captive screws (see the figures in section 11.1.2).
5. Unplug the heatsink fan (if applicable) from the system board.
6. Test the bond of the heatsink by twisting it using moderate pressure. If the heatsink is loose enough to be gently twisted, it is safe to remove it from the processor at this time. Proceed to step 10. If the heatsink cannot be loosened, then continue with step 7 to warm up the heatsink.

CAUTION: Always twist when trying to remove a heatsink. Never pull the heatsink straight out.

7. Turn on the computer and press the F10 key when prompted to enter the Computer Setup utility. It takes about 4-8 minutes for a primary processor and 8-12 minutes for a secondary processor (if present) to heat up enough to loosen the thermal interface bond between the heatsink and the processor.

CAUTION: Do not remove the heatsink from the processor while the computer is turned on.

Do not allow Windows to load as the processor may not heat up enough once the operating system has loaded.

If the computer cannot be powered up, a heatgun maybe used to warm up the heatsink/processor assembly.

8. Exit the Setup utility and turn off the computer before the operating system loads.
9. Tap the heatsink with your fingers to see if it is cool enough to touch. Remove the heatsink by gently twisting it only when it is safe to handle.

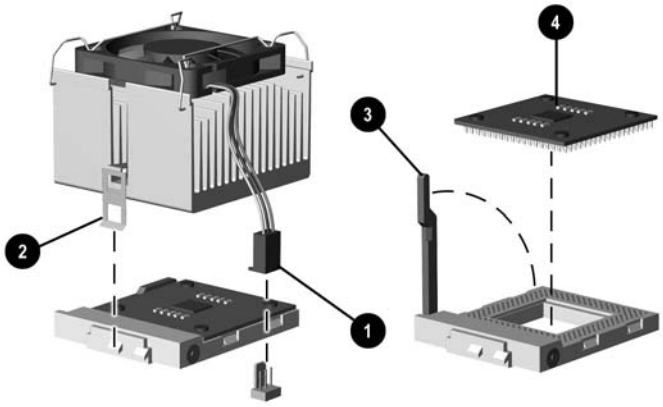
CAUTION: Always twist when trying to remove a heatsink, never pull the heatsink straight out.

10. Raise the handle on the ZIF socket to the full-open position.
11. Grasp the processor by the edges and pull straight up to remove it from the socket. See the figures in section 11.1.2 in this chapter.

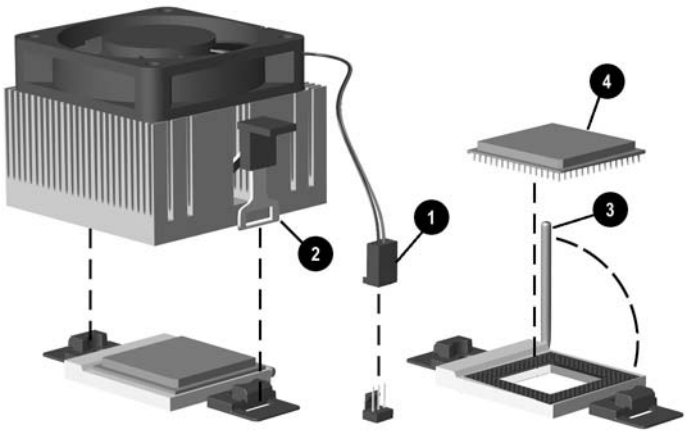
11.1.2 Sample Heatsink/Processor Assemblies

Heatsinks, fans , and mounting methods vary depending on model.

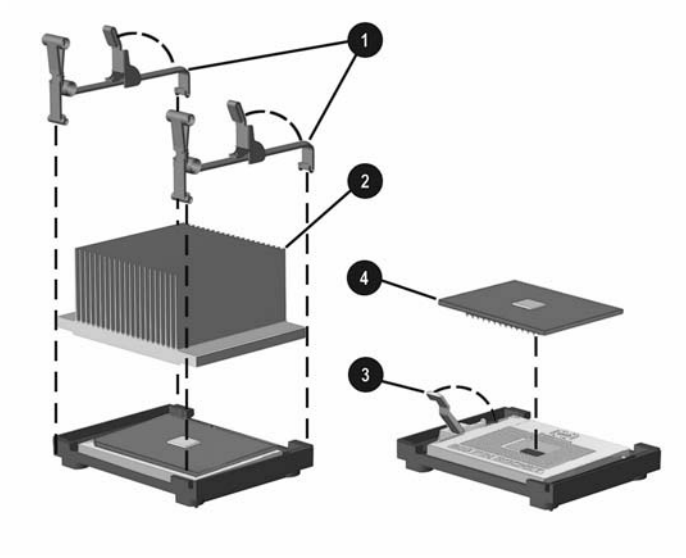
The numbered steps in the following illustrations indicate the sequence of either removal or installation (as indicated by the caption).



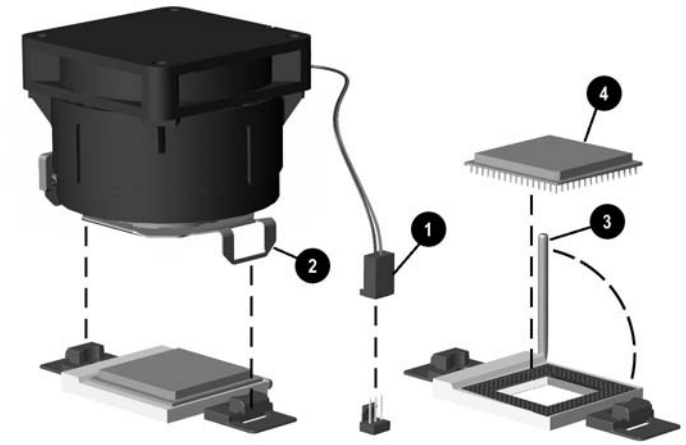
Type 1 Removal



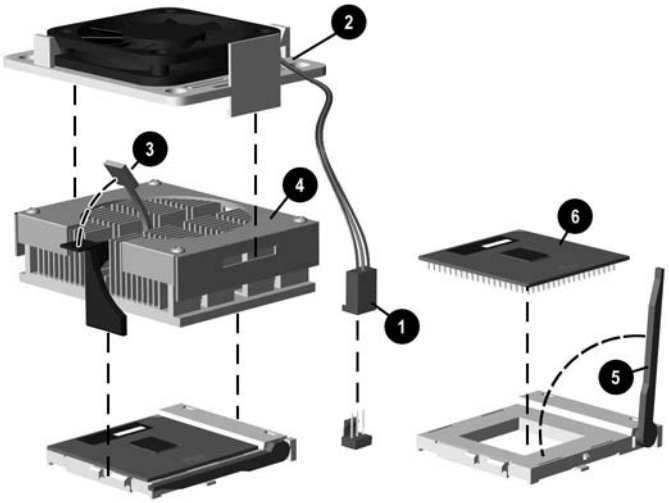
Type 2 Removal



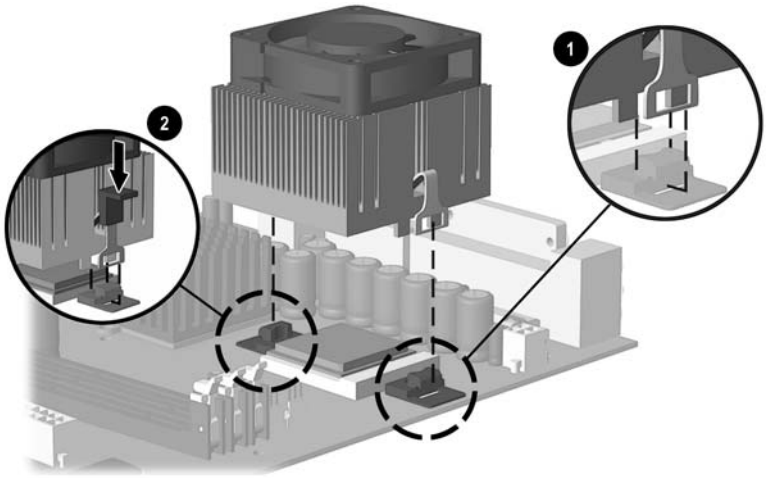
Type 3 Removal



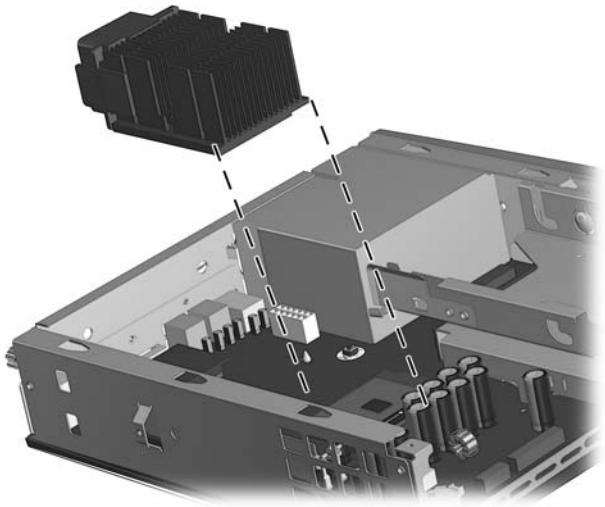
Type 4 Removal



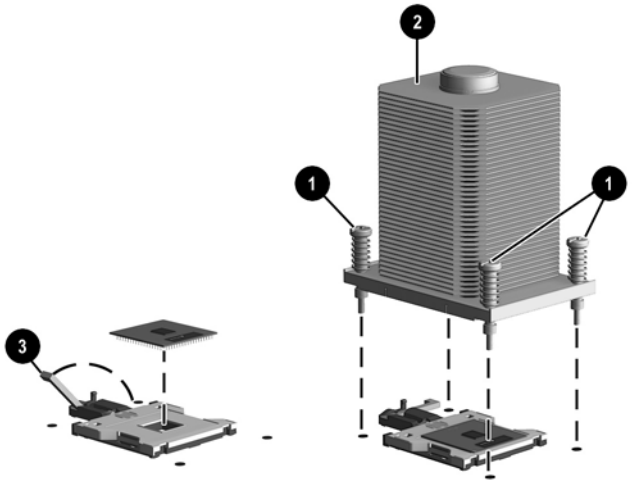
Type 5 Removal



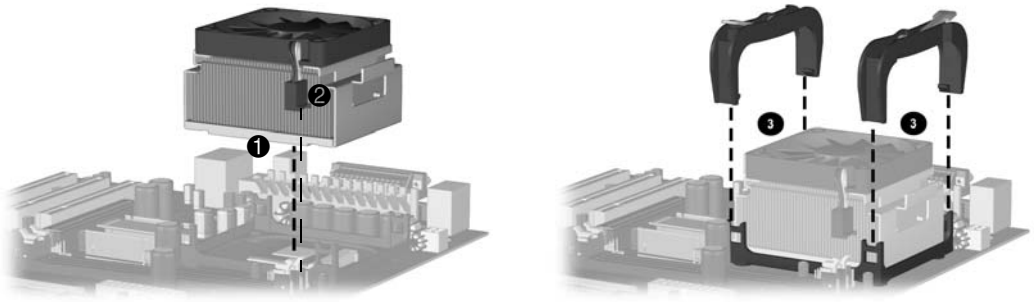
Type 6 Removal



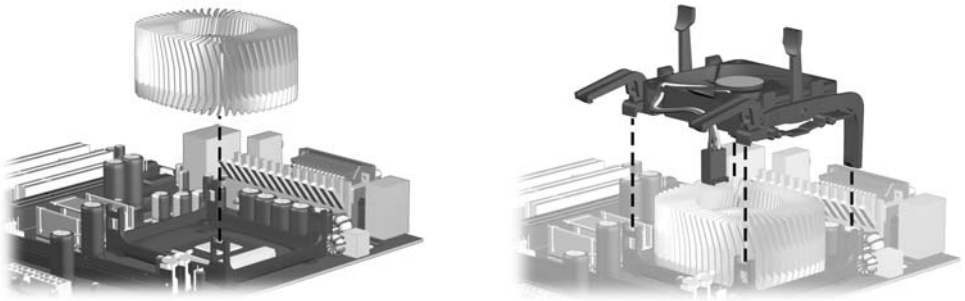
Type 7 Removal

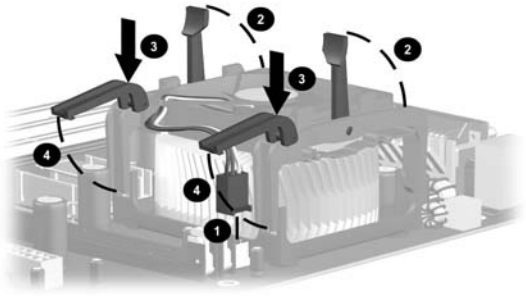


Type 8 Removal



Type 9 Installation





Type 10 Installation

11.1.3 Installing the Heatsink/Processor Assembly

CAUTION: A Multiprocessor system must have the primary processor socket populated for the system to operate. Refer to section 11.1.4 for multiprocessor information.

1. With the locking lever in the full-open position, install the processor into the socket.
2. Latch the processor securely in the ZIF socket by holding the processor down with a finger and lowering the locking lever to the horizontal position. Ensure that the processor is flush to the top of the socket (fully seated). See section 11.1.2 in this chapter.
3. If reusing the heatsink and/or processor, remove the old thermal pad, if present.
4. Clean the top of the processor using alcohol and a dry wipe or the alcohol pad included with the new heatsink, processor, or system board. Allow the solvent to evaporate (dry) before final assembly.

CAUTION: The processor should be installed on the system board prior to cleaning to prevent damaging its pins.

5. If present, remove the protective plastive cap from the bottom of the new heatsink.
6. If a new thermal pad is supplied with the new heatsink, processor, or system board, then attach the new thermal pad to the bottom of the heatsink and proceed to step 8. If a thermal pad is not supplied, continue with step 7.
7. If thermal paste or grease is supplied with the new heatsink, processor, or system board, then apply the thermal paste to the top of the processor. The paste or grease should be spread evenly over the top of the processor. If installing an Intel processor use all of the contents of the thermal syringe provided. If installing an AMD or Pentium III processor just use half of the themal syringe provided.

CAUTION: Not using a new thermal pad or thermal interface material could result in the system overheating and could cause a computer failure.

8. Position the heatsink in place, ensuring positive, flat contact with the top of the processor. Secure the heatsink with either the supplied clips or captive screws.
9. Connect the heatsink fan (if applicable) to the system board. See section 11.1.2 in this chapter.
10. Reinstall the computer cover or access panel, and start the computer.

11.1.4 Multiprocessor Information

Some workstations have multiprocessor capability. When you install a second processor, it must be the same speed, cache size, and type as the existing processor.

CAUTION: A primary processor must be installed in the primary processor slot when installing a second processor or the workstation will not function. Also, multiprocessor systems require that a Voltage Reguilator Module (VRM) is installed for each processor.

CAUTION: You must install a factory-approved VRM board when installing a second processor. Using a VRM board that is incompatible with the primary VRM board may severely or permanently damage the system board.

Multiprocessor systems shipped with just one processor installed will typically have screws installed in the heatsink mounting holes of the unpopulated secondary processor socket for system board stability. These screws must be removed before installing the secondary processor.

Hardware Abstraction Layer

To update Windows NT 4.0 or Windows 2000 to recognize a second processor using the Hardware Abstraction Layer (HAL), complete the following steps:

1. Start Windows.
2. Insert the upgrade diskette. Then select Start > Run.
3. Type

A:\setup.exe

and select OK.

4. Select Uniprocessor HAL and Kernel.
5. Select Upgrade and insert the media used to upgrade the operating system to a new Service Pack if requested; then click Retry.
6. If prompted, insert the operating system CD and click OK.
7. After the installation is complete, close the setup program and restart the computer.

A manual upgrade is necessary when installing a second processor after the system has gone through the software bundling process. If a second processor is installed prior to unbundling, a manual upgrade is not necessary.

11.2 System Board

The illustrations below provide examples of typical system board screw locations. Screw locations vary based on the computer model.

CAUTION: Check the position of all cables and wires before raising or lowering the drive cage to prevent cable damage.

If the processor must be removed from the system board refer to Section 11.1.1 in this chapter for complete instructions.

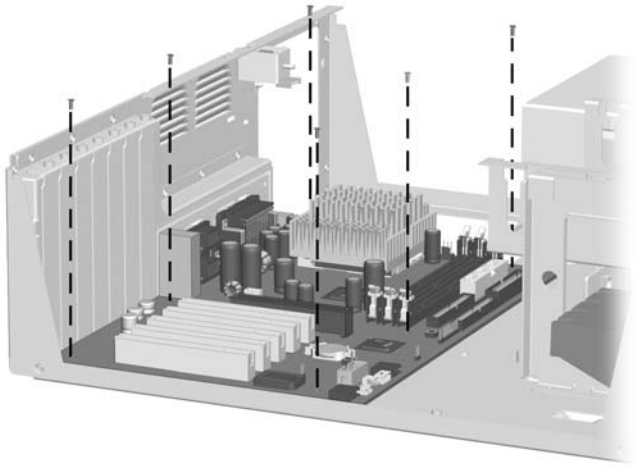
11.2.1 System Board Secured with Screws

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Remove all expansion boards.
4. Remove all graphics cards.
5. Disconnect all cables connected to the system board, noting their location for reinstallation.
6. Remove/move the baffle, as necessary.
7. Remove the screws connecting the system board to the chassis.

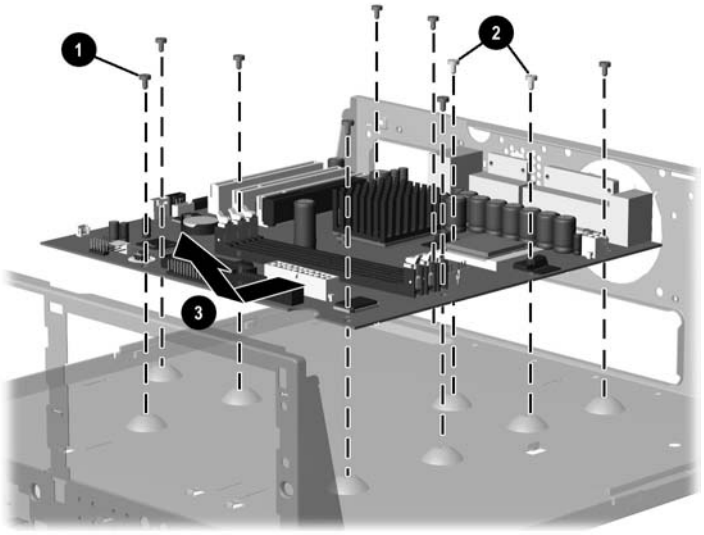
Some system boards use heatsinks retained with captive screws that secure to the chassis under the system board. Such systems require that the processor's heatsink be removed before removing the system board. Refer section 11.1.1 for the heatsink/processor separation procedure.

Multiprocessor system boards with only one processor installed may be secured with screws installed in some or all of the heatsink mounting holes of the unpopulated secondary processor socket. These screws will need to be removed before removing the system board.

8. Slide the system board toward the front of the chassis until the external connectors are clear of the I/O panel.
9. Lift the system board out of the computer.



Standard screw locations



System board with screws in heatsink brackets (DT shown)

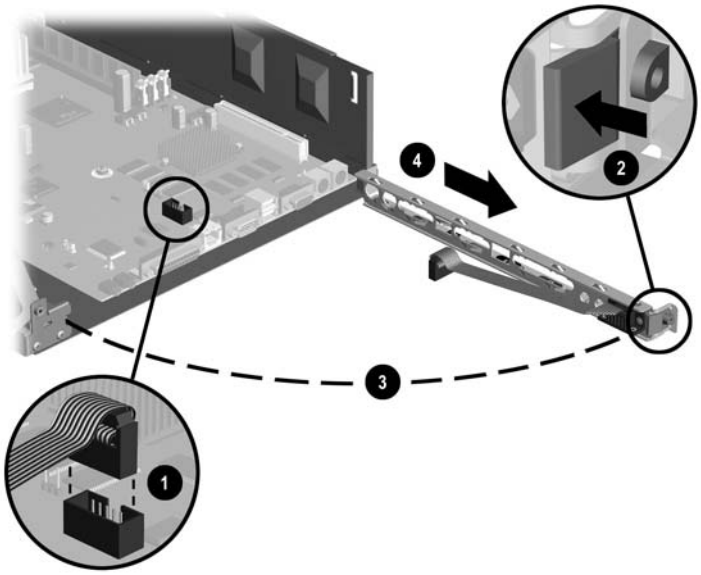
Screws marker ❷ are longer than the rest of the system board retaining screws. Ensure that they are installed in the proper location to prevent system board damage.

To install a system board, reverse the removal procedure.

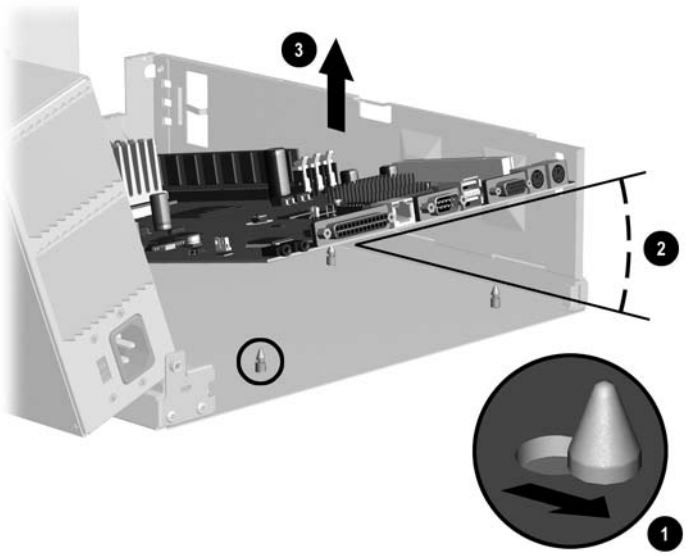
11.2.2 System Board Removal—Small Form Factor

The two small form factor chassis contain similar components; however, the orientation of components is mirrored between the two chassis.

1. Prepare the computer for disassembly.
2. Remove the computer cover.
3. Remove the expansion card cage.
4. Rotate the power supply to the upright position.
5. Rotate the drive cage to the upright position.
6. Remove the AGP expansion card (SFF, T2 only).
7. Remove the heatsink (SFF, T2 only).
8. Disconnect all cables from the system board ❶.
9. Press the green release tab on the end of the I/O panel ❷.
10. Swing the I/O panel away from the computer ❸ until it is at a 90 degree angle.
11. Remove the I/O panel from the chassis ❹.



12. Slide the system board toward the rear of computer until the metal standoffs that extend up from the base pan are positioned in the larger part of the keyhole slots in the system board ❶.
13. Raise the rear of the system board until it is at a 30 degree angle ❷; then, remove the system board by pulling it toward the rear of the computer, then lifting it up and out of the chassis ❸.



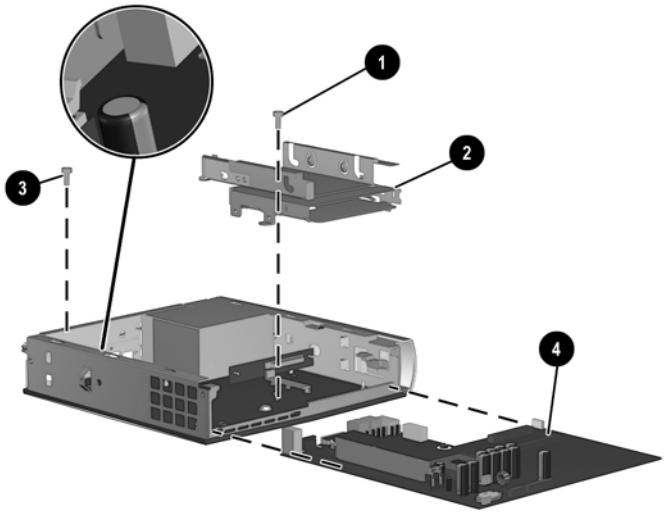
To replace the system board, reverse the removal procedures.

Install the CD audio before reinstalling the system board.

11.2.3 Ultra-Slim Desktop System Board Removal

1. Eject the drive from the MultiBay if necessary.
2. Prepare the computer for disassembly.
3. Remove the access panel.
4. Remove the front bezel.
5. Remove the front panel plate.
6. Remove the screw ❶ that attaches the drive cage to the system board.
7. Remove the drive cage ❷.
8. Remove the screw ❸ securing the system board.

.



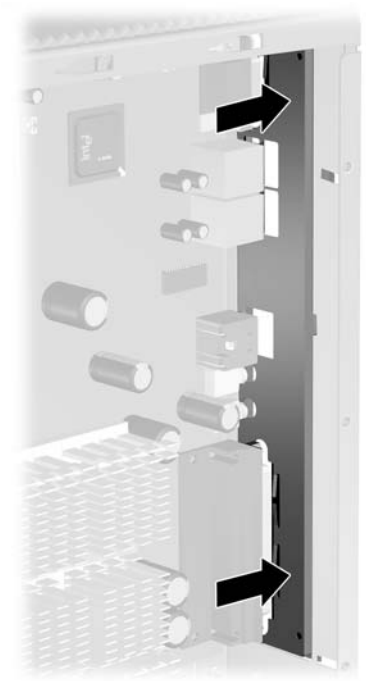
Place a protective pad beneath the computer to protect it.

9. Disconnect any cables that are attached to the system board, noting their location for reinstallation.
10. Slide the system board ❹ toward the front of the chassis until the external connectors are clear of the I/O panel.
11. Lift the system board out of the computer.

To install the system board, reverse the procedure.

11.2.4 iPAQ System Board Removal

1. Eject the drive from the MultiBay if necessary.
2. Prepare the computer for disassembly.
3. Remove both outer access panels.
4. Remove the MultiBay board.
5. Remove the hard drive.
6. Remove the right inner access panel.
7. Remove the I/O panel by pushing it out of the chassis from the inside.

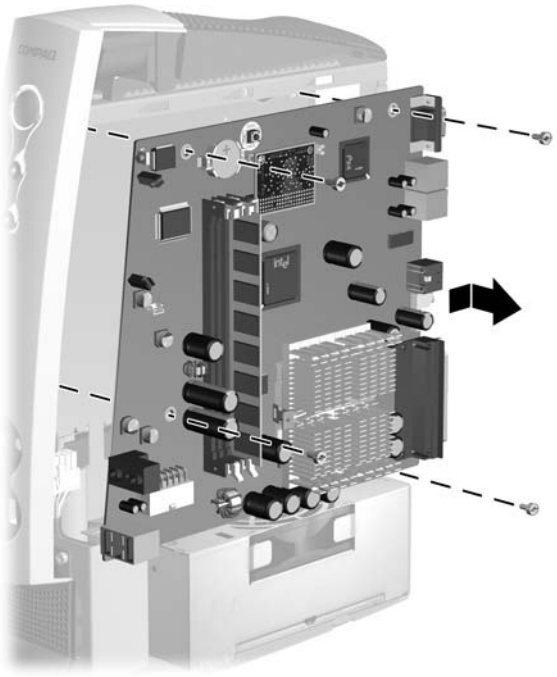


8. Lay the computer down on its side for greater stability.

Place a protective pad beneath the computer to protect it.

9. Disconnect any cables that are attached to the system board, noting their location for reinstallation.

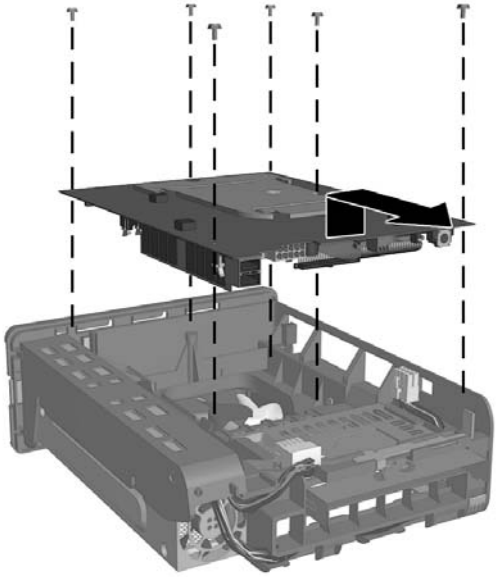
10. Remove the four retaining screws that secure the system board to the chassis.
11. Slide the board about 0.5 inches toward the rear of the chassis, then lift it up and out of the chassis.



12. To install a system board, angle the system board toward the I/O panel opening, then set the board on the chassis.
13. Install the retaining screws to secure the system board to the chassis.
14. Install the I/O panel. The panel is set correctly when you hear it click into place.
15. Complete the installation process by reversing steps 3 through 6 above.

11.2.5 e-PC System Board Removal

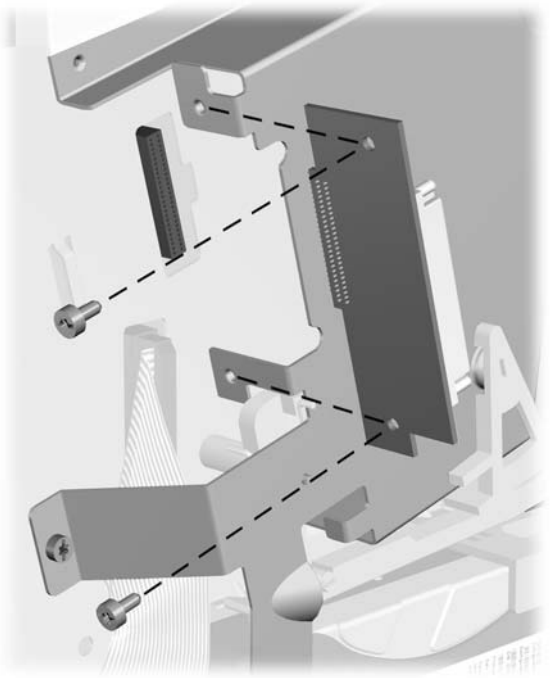
1. Prepare the computer for disassembly.
2. Remove the chassis from the cover assembly.
3. Disconnect the following cables from the system board (refer to the appropriate section in Chapter 12 for details):
   a. Power supply cables (2)
   b. CPU fan cable
   c. Hard drive cable
   d. Optical (CD) drive cable
4. Place the chassis upside down on a protected surface and remove the screws that hold the system board in place,
5. Tilt up the front edge of the system board and lift the board out as shown below.



To replace the system board, reverse the procedure, making sure that the system board is lowered into place with the rear (I/O) edge first.

11.3 iPAQ MultiBay Board

1. Prepare the computer for disassembly.
2. Eject the drive from the MultiBay if necessary.
3. Remove the left access panel.
4. Remove the two screws securing the MultiBay board to the housing.
5. Remove the board by pulling it straight out of the system board.



The MultiBay board is keyed for proper orientation.

To install the MultiBay board, reverse the above procedure.

11.4 Battery

The battery that comes with your computer provides power to the real-time clock and has a minimum lifetime of about three years. When replacing the battery, use a battery equivalent to the battery originally installed on the computer. The computer comes with a 3-volt lithium coin cell battery.

The lifetime of the lithium battery can be extended by plugging the computer into a live AC wall socket. The lithium battery is only used when the computer is NOT connected to AC power.

WARNING: This computer contains an internal lithium manganese dioxide battery. There is a risk of fire and burns if the battery is not handled properly. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
- Do not expose to temperatures higher than 140°F (60°C)
- Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
- Replace the battery only with the HP/Compaq spare designated for this product.

CAUTION: Before replacing the battery, it is important to back up the computer CMOS settings. When the battery is removed or replaced, the CMOS settings will be cleared. Refer to the *Troubleshooting Guide* for information on backing up the CMOS settings.

Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. In order to forward them to recycling or proper disposal, please use the public collection system or return them to HP/Compaq, their authorized partners, or their agents.

CAUTION: Static electricity can damage the electronic components of the computer or optional equipment. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object.

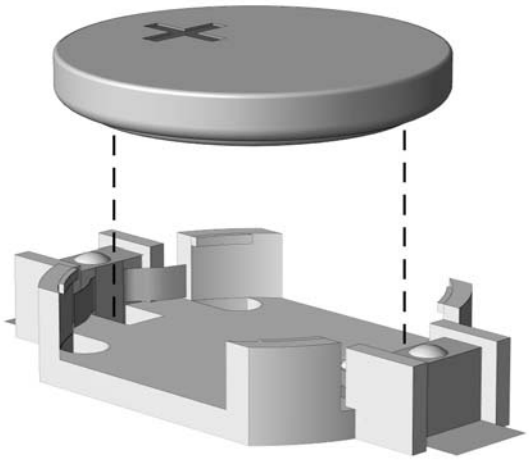
1. Prepare the computer for disassembly.

It may be necessary to remove an expansion card to gain access to the battery.

2. Locate the battery and battery holder on the system board.
3. Depending on the type of battery holder on your system board, complete the following instructions to replace the battery.

11.4.1 Type 1 Battery Holder

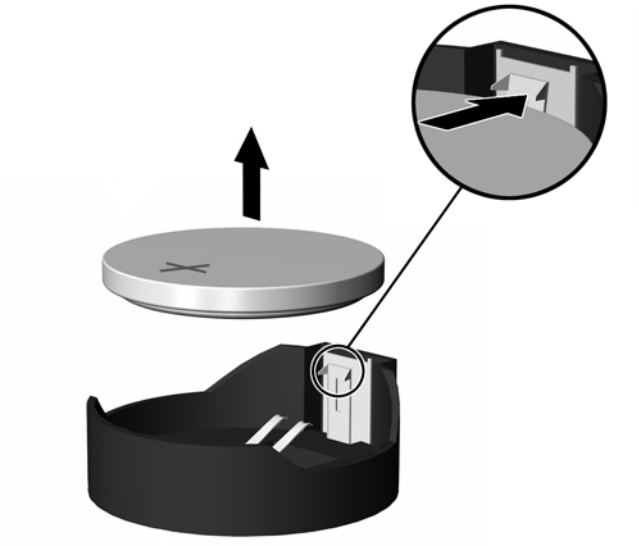
1. Lift the battery out of its holder.



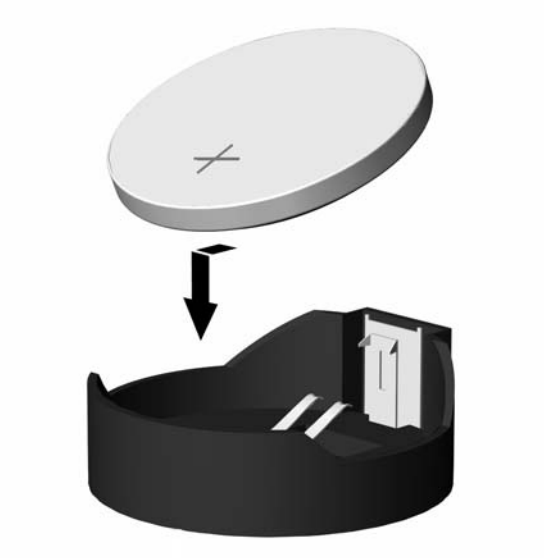
2. Slide the replacement battery into position, positive side up.
3. The battery holder automatically secures the battery in the proper position.
4. Replace the computer cover or access panel.
5. Plug in the computer and turn on power to the computer.
6. Reset the date and time, your passwords, and any special system setups, using Computer Setup. Refer to the *Computer Setup Guide.*

11.4.2 Type 2 Battery Holder

1. To release the battery from its holder, squeeze the metal clamp that extends above one edge of the battery.
2. When the battery pops up, lift it out.



3. To insert the new battery, slide one edge of the replacement battery under the holder's lip with the positive side up. Push the other edge down until the clamp snaps over the other edge of the battery.



After the battery has been replaced, use the following steps to complete this procedure.

4. Replace the computer cover or access panel.
5. Plug in the computer and turn on power to the computer.
6. Reset the date and time, your passwords, and any special system setups, using Computer Setup. Refer to the *Computer Setup Guide.*

12

Removal and Replacement Procedures Main Power and Cooling

For an overview of the different chassis discussed in this chapter, refer to Chapter 6 “Identifying the Chassis, Routine Care, and Disassembly Preparation.” The chassis are: Convertible Minitower (CMT), Microtower, T (uT), Desktop (DT), Small Form Factor (SFF), Ultra-Slim Desktop, iPAQ, and the e-PC.

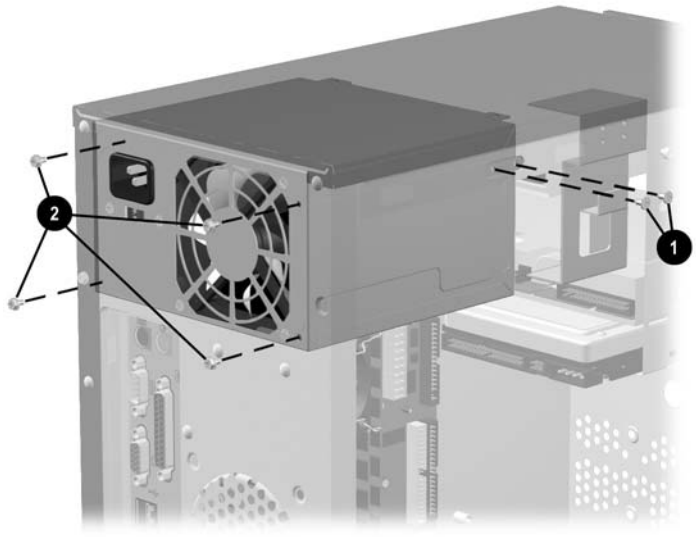
WARNING: Voltage is always present within certain areas of the unit when the computer is plugged into an active AC outlet. To avoid possible personal injury and damge to the equipment the power cord should be disconnected from the computer and/or the AC outlet before opening the computer

12.1 Power Supply

This section describes the removal and replacement procedures for power supplies used in the Convertible Minitower (CMT), Microtower, T (uT), Desktop (DT), Small Form Factor (SFF), Ultra-Slim Desktop, iPAQ, and the ePC form factors.

12.1.1 Microtower/Convertable Minitower

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Disconnect all power cables from the mass storage devices and from the system board.
4. Remove the screws that connect the bracket to the chassis (if present) ❶.
5. Remove the screws that connect the power supply to the chassis ❷.
6. Slide the power supply toward the front of the computer until it clears the notches in the base pan, then lift it out of the computer.



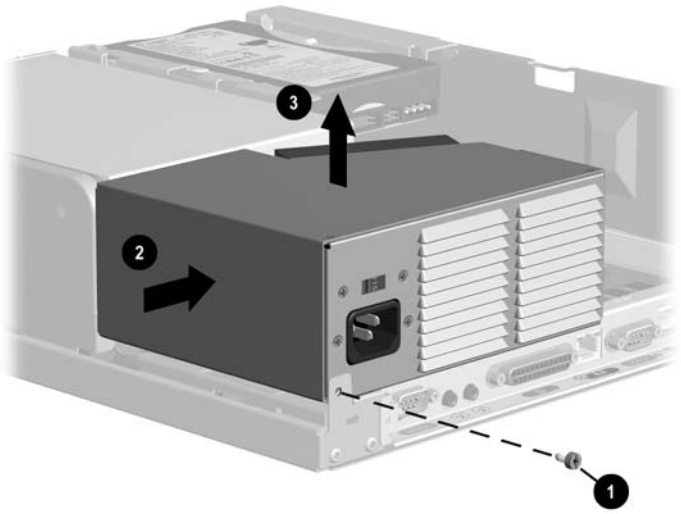
CMT shown

To install the power supply, reverse the removal procedure.

12.1.2 Small Form Factor

The two small form factor chassis contain virtually the same components; however, the orientation of components is mirrored between the two chassis.

1. Prepare the computer for disassembly.
2. Remove the computer cover.
3. Remove the expansion card cage.
4. Disconnect all power cables from the mass storage devices and from the system board.
5. Remove the screw that secures the power supply to the back of the chassis ❶.
6. Slide the back of the power supply toward the right ❷, then lift the power supply out of the computer ❸.



SFF, T1 shown

To replace the power supply, reverse the removal procedures.

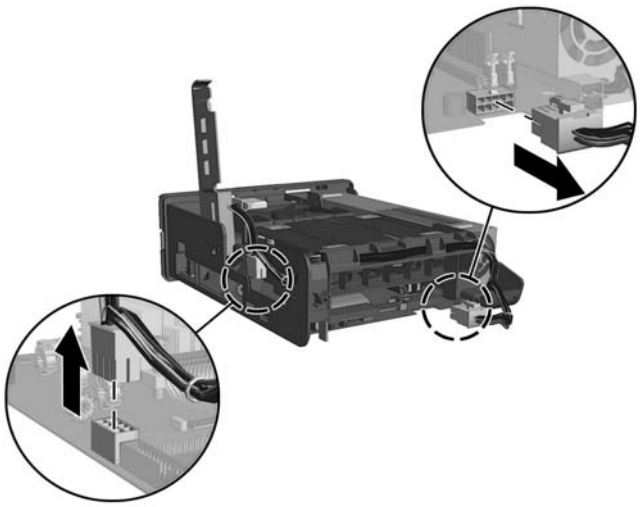
12.1.3 e-PC

The power supply of the e-PC has two power cables (one short, one long) that connect to the system board.

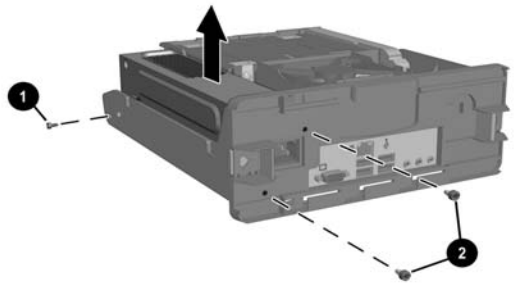
1. Prepare the computer for disassembly.
2. Remove the computer cover.
3. Remove the hard drive assembly.

It is not necessary to disconnect the cables from the hard drive assembly, which may be flipped over and laid down on the working surface. However, disconnecting the hard drive cables may allow easier access to the long power supply cable connector.

4. Disconnect the short power supply cable from the system board connctor by pulling it out from the front of the chassis.
5. Disconnect the long power supply cable from the left side of the system board by pulling it straight up from the system board and remove the cable from the routing tray of the chassis.



6. Remove the screw ❶ that secures the power supply to the right side of the chassis.



7. Remove the two screws ❷ that secure the power supply to the rear of the chassis.
8. Lift the power supply straight up from the chassis.

Power supply installation is the reverse of removal.

CAUTION: Care should be taken to ensure that the long power supply cable is routed and secured correctly in the routing tray of the chassis to avoid cable mashing or pinching by the hard drive assembly or chassis cover

12.2 Chassis Fan

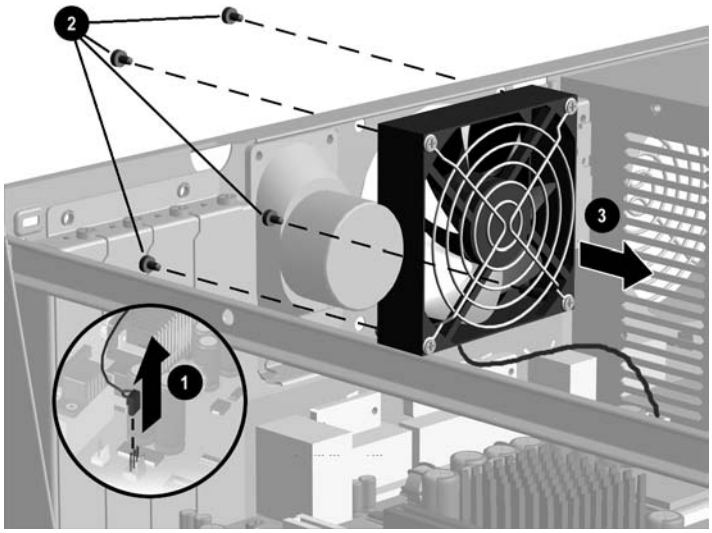
12.2.1 SFF, Desktop, and Tower

The location of the chassis fan and the fan's power cable connector on the system board may vary.

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. If present, remove the air baffle.
4. Disconnect the fan power cable from the system board ❶.

For the Small Form Factor, the hard drive must be removed, the drive cage rotated to the upright position, and the front trim removed in order to remove the fan.

5. Remove the screws that secure the fan to the chassis ❷.
6. Lift the fan out of the chassis ❸.



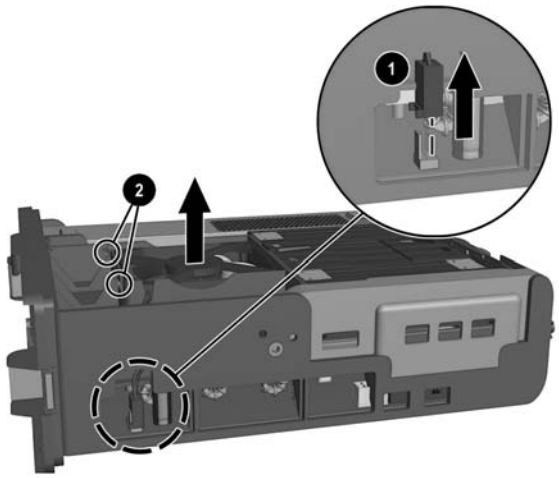
DT shown

To replace the chassis fan, reverse the above procedure. When installing the fan, ensure that the blows air **out** of the computer.

12.2.2 e-PC

The CPU fan of the e-PC resembles a chassis fan, but is mounted directly over the CPU's heatsink.

1. Prepare the computer for disassembly.
2. Remove the computer cover.
3. Disconnect the fan power cable from the system board connector ❶ accessible from the left side of then chassis.



4. Press the two tabs ❷ toward the rear of the chassis while lifting up on the fan assembly. The fan assembly lifts straight up and out.

To install a fan assembly:

1. Place the fan into position and push down until it snaps into place.
2. Connect the fan power cable to the system board connector accessible from the left side of the chassis.

12.3 Air Baffles

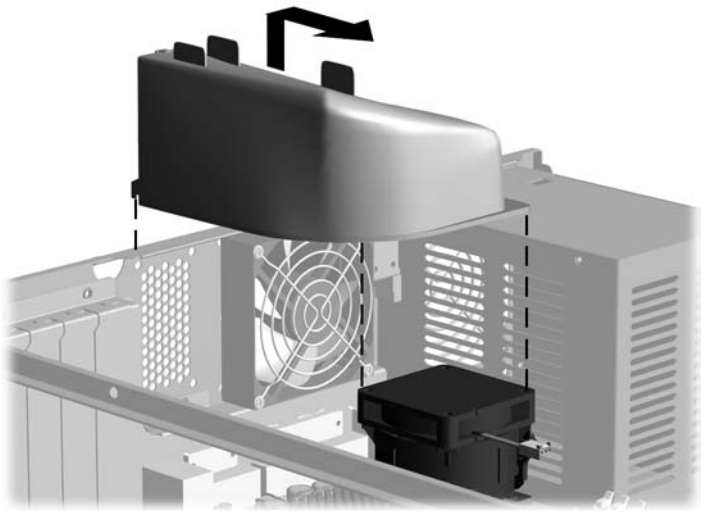
Some models are equipped with internal air baffles that redirect air flow in order to help regulate internal temperature. This section contains examples of the types of baffles currently being used. The baffle in your computer may vary from the examples shown

.

CAUTION: Always reinstall an air baffle after it has been removed. Failure to do so may cause the computer to overheat and could result in loss of data or damage to the computer.

12.3.1 Type 1 Baffle

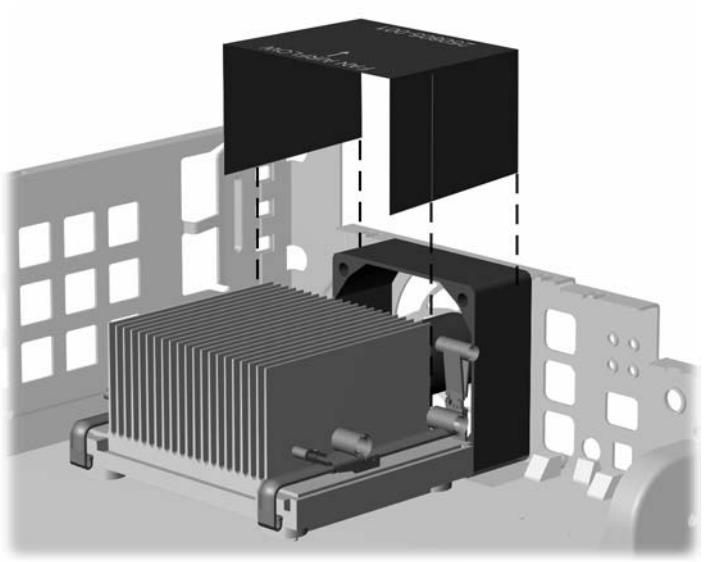
1. Prepare the computer for disassembly.
2. Remove the computer cover.
3. Slide the baffle up to disengage the retaining tab from its slot in the back of the chassis.
4. Pull the baffle towards the front of the computer to remove it from the chassis.



To replace the air baffle, reverse the above procedure.

12.3.2 Type 2 Baffle

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. The air baffle connects to the heatsink with an adhesive. To remove the baffle, simply pull until the bond between the baffle and the heatsink is broken.



SFF, T2 shown

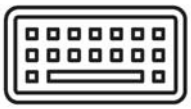
To reinstall the air baffle, reverse the above procedure.

A

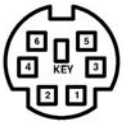
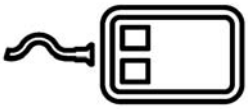
Connector Pin Assignments

This appendix contains the pin assignments for many computer and workstation connectors. Some of these connectors may not be used on the product being serviced.

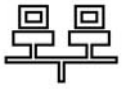
Enhanced Keyboard

Connector and Icon	Pin	Signal
 	1	Data
	2	Unused
	3	Ground
	4	+5 VDC
	5	Clock
	6	Unused

Mouse

Connector and Icon	Pin	Signal
 	1	Data
	2	Unused
	3	Ground
	4	+5 VDC
	5	Clock
	6	Unused

Ethernet BNC

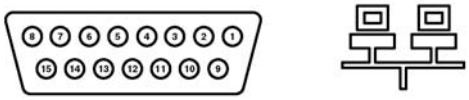
Connector and Icon	Pin	Signal
 	1 (Center)	Data
	2 (Shield)	Ground

Ethernet RJ-45

Connector and Icon	Pin	Signal
	1	(+) Transmit Data
	2	(-) Transmit Data
	3	(+) Receive Data
	4	Unused
	5	Unused
	6	(-) Receive Data
	7	Unused
	8	Unused

Ethernet AUI

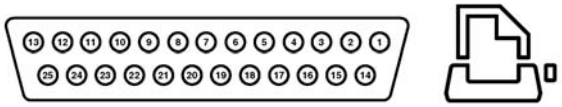
Connector and Icon



Pin	Signal	Pin	Signal
1	Ground	9	Positive AUI Differential Receive
2	Negative AUI Differential Collision	10	+12V
3	Positive AUI Differential Collision	11	Ground
4	Negative AUI DifferentialTransmit	12	Ground
5	Positive AUI DifferentialTransmit	13	Unused
6	Ground	14	Unused
7	Ground	15	Unused
8	Negative AUI Differential Receive	16	Unused

Parallel Interface

Connector and Icon



Pin	Signal	Pin	Signal	Pin	Signal
1	Strobe	7	Data Bit 5	13	Select
2	Data Bit 0	8	Data Bit 6	14	Auto Linefeed
3	Data Bit 1	9	Data Bit 7	15	Error
4	Data Bit 2	10	Acknowledge	16	Initialize Printer
5	Data Bit 3	11	Busy	17	Select IN
6	Data Bit 4	12	Paper End	18-25	Signal Ground

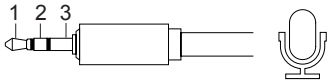
Serial Interface

Connector and Icon	Pin	Signal
	1	Carrier Detect
	2	Receive Data
	3	Transmit Data
	4	Data Terminal Ready
	5	Signal Ground
	6	Data Set Ready
	7	Request to Send
	8	Clear to Send
	9	Ring Indicator

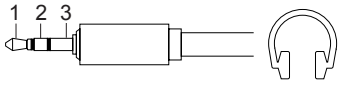
USB

Connector and Icon	Pin	Signal
	1	VCC
	2	- Data
	3	+ Data
	4	Ground

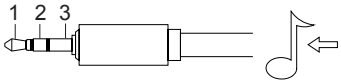
Microphone

Connector and Icon (1/8" miniphone)	Pin	Signal
	1 (Tip)	Audio
	2 (Ring)	Power
	3 (Shield)	Ground

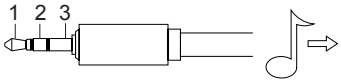
Headphone

Connector and Icon (1/8" miniphone)	Pin	Signal
	1 (Tip)	Audio_Left
	2 (Ring)	Audio_Right
	3 (Shield)	Ground

Line-In Audio

Connector and Icon (1/8" miniphone)	Pin	Signal
	1 (Tip)	Audio_In_Left
	2 (Ring)	Audio_In_Right
	3 (Shield)	Ground

Line-Out Audio

Connector and Icon (1/8" miniphone)	Pin	Signal
	1 (Tip)	Audio_Out_Left
	2 (Ring)	Audio_Out_Right
	3 (Shield)	Ground

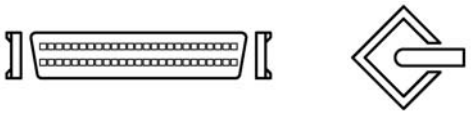
SCSI Low Voltage Differential/Single Ended (LVD/SE)

Connector and Icon

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1-16	Ground	40	-D0	49-50	Ground	60	-MSG
17-18	TERMPWR	41	-D1	51-52	TERMPW	61	-SEL
19	Reserved	42	-D1	53	Reserved	62	-C/D
20-34	Ground	43	-D3	54	Ground	63	-REQ
35	-D12	44	-D4	55	-ATN	64	-I/O
36	-D13	45	-D5	56	Ground	65	-D
37	-D14	46	-D6	57	-BSY	66	-D
38	-D15	47	-D7	58	-ACK	67	-D
39	-DP1	48	-DP0	59	-RST	68	-D

Ultra SCSI

Connector and Icon



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1-11	Ground	29	DB3	37	Reserved	45	RST #
12	Reserved	30	DB4	38	TERMPWR	46	MSG #
13	Open	31	DB5	39	Reserved	47	SEL #
14	Reserved	32	DB6	40	Ground	48	C/D
15-25	Ground	33	DB7	41	ATN #	49	REQ #
26	DB0	34	DBP	42	Ground	50	Input/Output
27	DB1	35	Ground	43	BSY #		
28	DB2	36	Ground	44	ACK #		

External Infrared Transceiver

Connector and Icon

Pin	Signal	Pin	Signal	Pin	Signal
1	Transmit	4	5V	7	Not Used
2	Receive	5	Mode	8	Not Used
3	Ground	6	Not Used		

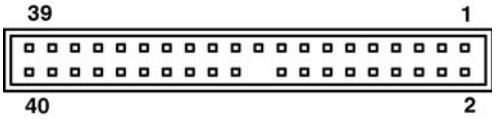
Monitor

Connector and Icon

Pin	Signal	Pin	Signal	Pin	Signal
1	Red Analog	6	Ground	11	Monitor ID
2	Green Analog	7	Ground	12	DDC Serial Data
3	Blue Analog	8	Ground	13	Horizontal Sync
4	Monitor ID	9	+5V DC	14	Vertical Sync
5	Ground	10	Ground	15	DDC Serial Clock

ATA/ATAPI (IDE) Standard Drive Cable

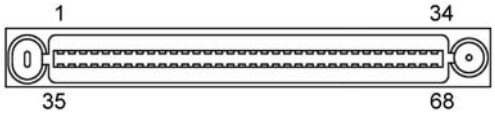
Connector



Pin	Signal	Pin	Signal	Pin	Signal
1	Reset	15	DD1	29	DMAK
2	Ground	16	DD14	30	Ground
3	DD7	17	DD0	31	INTRQ
4	DD8	18	DD15	32	IOCS16
5	DD6	19	Ground	33	DA1
6	DD9	20	(Key)	34	PDIAG (cable detect)
7	DD5	21	DMARQ	35	DA0
8	DD10	22	Ground	36	DA2
9	DD4	23	DIOW	37	CS1FX
10	DD11	24	Ground	38	CS3FX
11	DD3	25	DIOR	39	DASP
12	DD12	26	Ground	40	Ground
13	DD2	27	IORDY		
14	DD13	28	CSEL		

MultiBay CD-ROM Adapter

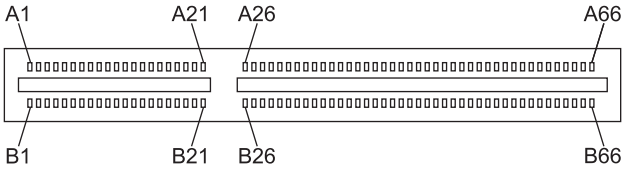
Connector



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	RESDRV_	18	D15	35	A0	52	FP05
2	GROUND	19	GROUND	36	A2	53	FP06
3	D07	20	(key)	37	CS1FX	54	FP07
4	D08	21	DRQ	38	CS3FX	55	FP08
5	D06	22	GROUND	39	DASP	56	FP09
6	D09	23	IOW	40	GROUND	57	FP10
7	D05	24	GROUND	41	+5VMLOG	58	FP11
8	D10	25	IOR	42	-5VMOT	59	FP12
9	D04	26	GROUND	43	GROUND	60	FP13
10	D11	27	IOCHDRY	44	AUDIO_L	61	FP14
11	D03	28	CABLE SELECT	45	A_GROUND_R	62	FP15
12	D12	29	DAK	46	A_GROUND_I	63	FP16
13	D02	30	GROUND	47	audio_r	64	FP17
14	D13	31	IRQ	48	FP01	65	FP18
15	D01	32	IO16	49	FP02	66	FP19
16	D14	33	A1	50	FP03	67	FP20
17	D00	34	PDIAG	51	FP04	68	FP21

Accelerated Graphics Port (AGP)

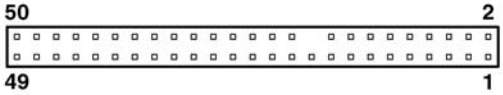
Connector



Pin	Signal A	Signal B	Pin	Signal A	Signal B
1	+12 V	OVRCNT#	34	Vddq	Vddq
2	TYPEDET#	+ 5V	35	AD22	AD21
3	Reserved	+ 5V	36	AD20	AD19
4	USB-	USB+	37	Ground	Ground
5	Ground	Ground	38	AD18	AD17
6	INTA#	INTB#	39	AD16	C/BE2#
7	RST#	CLK	40	Vddq	Vddq
8	GNT#	REQ#	41	FRAME#	IRDY#
9	VCC3.3	VCC3.3	42	Reserved	3.3VAux
10	ST1	ST0	43	Ground	Ground
11	Reserved	ST2	44	Reserved	Reserved
12	PIPE#	RBF#	45	VCC 3.3	VCC 3.3
13	Ground	Ground	46	TRDY#	DEVSEL#
14	WBF#	Reserved	47	STOP#	Vddq
15	SBA1	SBA0	48	PME#	PERR#
16	VCC 3.3	VCC 3.3	49	Ground	Ground
17	SBA3	SBA2	50	PAR	SERR#
18	SB_STB#	SB_STB	51	AD15	C/BE1#
19	Ground	Ground	52	Vddq	Vddq
20	SBA5	SBA4	53	AD13	AD14
21	SBA7	SBA6	54	AD11	AD12
22	Reserved	Reserved	55	Ground	Ground
23	Ground	Ground	56	AD9	AD10
24	Reserved	3.3 Vaux	57	C/BE0#	AD8
25	VCC 3.3	VCC 3.3	58	Vddq	Vddq
26	AD30	AD31	59	AD_STB0#	AD_STB0
27	AD28	AD29	60	AD6	AD7
28	VCC 3.3	VCC 3.3	61	Ground	Ground
29	AD26	AD27	62	AD4	AD5
30	AD24	AD25	63	AD2	AD3
31	Ground	Ground	64	Vddq	Vddq
32	AD_STB1#	AD_STB1	65	AD0	AD1
33	C/BE3#	AD23	66	VREFGC	VREFCG

Slimline IDE CD-ROM Connector for SFF chassis using 810 and 810e Chipsets

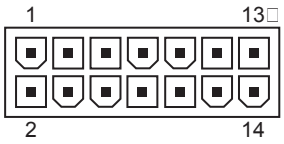
Connector



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	RESDRV_	14	GROUND	27	D07	40	D08
2	D06	15	D09	28	D05	41	D10
3	D04	16	D11	29	D03	42	D12
4	D02	17	D13	30	D01	43	D14
5	D00	18	D15	31	Ground	44	(KEY)
6	DREQ	19	Ground	32	IOW	45	Ground
7	IOR	20	Ground	33	OCHRDY	46	CABLE SELECT
8	DAK	21	Ground	34	IRQ	47	IO16
9	A1	22	PDIAG	35	A0	48	A2
10	CS1FX	23	CS3FX	36	DASP	49	Ground
11	AUDIO_R	24	AUDIO_L	37	A_GND_R	49	A_GND_L
12	+5VMOT1	25	+5VMOT2	38	+5VMOT3	50	+5VMOT4
13	+5VMLOG1	26	+5VMLOG2	39	DASP		

14-Pin Power (BX Chipset-Based Board

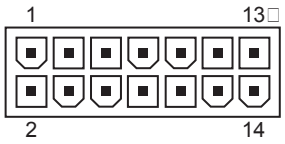
Connector



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	+3.3 V	5	RTN	9	-12 v	13	+3.3 V Sense return
2	+3.3 V Sense	6	+5 V	10	Fan OFF	14	+12 V
3	RTN	7	RTN	11	ON/STBY		
4	+5 V	8	+3.3 V	12	+5 V Aux		

14-Pin Power (810, 810E, 820, and 845 Chipset-Based Boards)

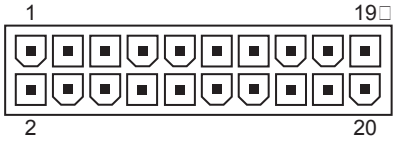
Connector



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	+3.3 V	5	RTN	9	-12 v	13	Fan speed
2	+3.3 V Aux	6	+5 V	10	Fan OFF	14	+12 V
3	RTN	7	RTN	11	ON/STBY		
4	+5 V	8	+3.3 V	12	+5 V Aux		

20-Pin Power (Deskpro EP)

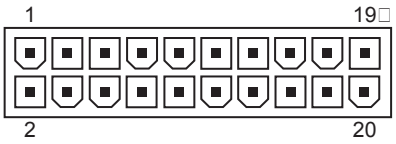
Connector



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	+3.3 V	6	+5 V	11	+3.3 V	16	RTN
2	+3.3 V	7	RTN	12	-12 V	17	RTN
3	RTN	8	Fan OFF	13	RTN	18	-5 V
4	+5 V	9	+5 V Aux	14	ON/STBY	19	+5 V
5	RTN	10	+12 V	15	RTN	20	+5 V

20-Pin Power (Deskpro EN)

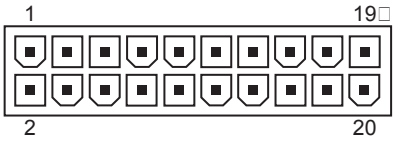
Connector



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	3 V	6	+5 V	11	+3 V	16	RTN/RS
2	3 V/RS	7	Aux RTN	12	-12 V	17	RTN
3	RTN	8	Fan OFF	13	RTN	18	-5 V
4	+5 V	9	+5 V Aux	14	ON/STBY	19	+5 V
5	RTN	10	+12 V	15	RTN	20	+5 V

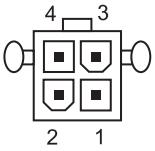
24-Pin Power

Connector



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	+3.3 V	7	Aux RTN	13	+3.3 V	19	RTN
2	+3.3 V	8	Fan OFF	14	-12 V	20	-5 V
3	RTN	9	+5 V Aux	15	RTN	21	+5 V
4	+5 V	10	+12 V	16	ON/STBY	22	+5 V
5	RTN	11	3.3 V Aux	17	RTN	23	3.3 V R/S
6	+5 V	12	Fan CMD	18	RTN/(R/S)	24	Fan Sink

4-Pin Power (for CPU)

Connector and Icon	Pin	Signal
	1	RTN
	2	RTN
	3	12.8 Vcpu
	4	12.8 Vcpu

B

Power Cord Set Requirements

The voltage select switch feature on the computer permits it to operate from any line voltage between 100-120 or 220-240 volts AC.

The power cord set received with the computer meets the requirements for use in the country where you purchased the equipment.

Power cord sets for use in other countries must meet the requirements of the country where you use the computer. For more information on power cord set requirements, contact your authorized HP dealer, reseller, or service provider.

General Requirements

The requirements listed below are applicable to all countries:

1. The length of the power cord set must be at least 6.00 feet (1.8 m) and a maximum of 9.75 feet (3.0 m).
2. All power cord sets must be approved by an acceptable accredited agency responsible for evaluation in the country where the power cord set will be used.
3. The power cord set must have a minimum current capacity of 10A and a nominal voltage rating of 125 or 250 volts AC, as required by each country's power system.
4. The appliance coupler must meet the mechanical configuration of an EN 60 320/IEC 320 Standard Sheet C13 connector, for mating with appliance inlet on the Switch Box.

Country-Specific Requirements

Additional requirements specific to a country are shown in parentheses and explained below.

Country	Accrediting Agency	Country	Accrediting Agency
Australia (1)	EANSW	Italy (1)	IMQ
Austria (1)	OVE	Japan (3)	METI
Belgium (1)	CEBC	Norway (1)	NEMKO
Canada (2)	CSA	Sweden (1)	SEMKO
Denmark (1)	DEMKO	Switzerland (1)	SEV
Finland (1)	SETI	United Kingdom (1)	BSI
France (1)	UTE	United States (2)	UL
Germany (1)	VDE		

1. The flexible cord must be <HAR> Type HO5VV-F, 3-conductor, 1.0 mm^2 conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country where it will be used.
2. The flexible cord must be Type SJT or equivalent, No. 18 AWG, 3-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15A, 125V) or NEMA 6-15P (15A 250V) configuration.
3. Appliance coupler, flexible cord, and wall plug must bear a "T" mark and registration number in accordance with the Japanese Dentori Law. Flexible cord must be Type VCT or VCTF, 3-conductor, 1.0 mm^2 conductor size. Wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7A, 125V) configuration.

C

POST Error Messages

An error message results if the Power-On Self-Test (POST) encounters a problem. This test runs when the system is turned on, checking assemblies within the computer and reporting any errors found.

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
101-Option ROM Error	1L, 1S	System ROM checksum.	Verify the correct ROM. Flash the ROM if needed. If an expansion card was recently added, remove it and see if the problem remains. Clear CMOS. If the message disappears, there may be a problem with the expansion card. Replace the system board.
102-System Board Failure	None	DMA, timers, etc.	Clear CMOS. Remove expansion boards. Replace the system board.
103-System Board Failure	None	DMA, timers, etc.	Clear CMOS. Remove expansion boards. Replace the system board.
150-SafePost Active	None	A PCI expansion card is not responding.	Restart the computer. Disable SafePost. If the expansion card does not respond, replace the card.
162-System Options Not Set	2S	Configuration incorrect. RTC (real-time clock) battery may need to be replaced. Battery life is approximately 3 years.	Run Computer Setup (F10 Setup). Set the date and time under Control Panel or in F10 Setup depending on the operating system. If the problem persists, replace the RTC battery.

* L = Long, S = Short

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
163-Time & Date Not Set	2S	Invalid time or date in configuration memory. RTC (real-time clock) battery may need to be replaced. Battery life is approximately three years. CMOS jumper may not be properly installed.	Set the date and time under Control Panel or in F10 Setup depending on the operating system. If the problem persists, replace the RTC battery. Check for proper placement of the CMOS jumper.
164-Memory Size Error	2S	Memory configuration is incorrect.	Run Computer Setup (F10 Setup) or Windows utilities. Make sure memory module(s) (if any) are installed properly. If third party memory has been added, test using HP- or Compaq-only memory. Verify proper memory module type.
183-Invalid Processor Jumper Setting	2S	System board jumper improperly set.	Reset system board jumpers to match processor and bus speeds.
201-Memory Error	None	RAM failure.	Run Computer Setup (F10 Setup) or Windows utilities. Ensure memory and continuity modules are installed correctly. Verify proper memory module type. Remove and replace memory module(s) one at a time to isolate faulty module. Replace the faulty memory module(s). If error persists after replacing memory modules, replace the system board.
202-Memory Type Mismatch	None	Memory modules do not match each other.	Replace memory modules with matched sets.

* L = Long, S = Short

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
207-ECC Corrected Single Bit Errors in Memory Socket(s) y,y	2S	Single Bit ECC error.	Verify proper memory module type. Try another memory socket. Replace memory module if problem persists.
212-Failed Processor	None	Processor has failed to initialize.	Reseat the processor in its socket. If the processor does not respond, replace it.
213-Incompatible memory Module in memory Socket(s) X,X, X	2S	A memory module in memory socket identified in the error message is missing critical SPD information, or is incompatible with the chipset.	Verify proper memory module type. Try another memory socket. Replace memory with a module conforming to the SPD standard.
214-Memory Device Failure. Error Code: XX Memory Module Socket(s):XX	None	A specific error has occurred in a RDRAM device installed in the identified socket.	Verify proper memory module type. Try another memory socket. Replace memory module if problem persists.
215-RIMM Configuration Error	None	RIMMs not properly installed.	Populate RIMM sockets starting with slot no. 1 and do not leave any memory sockets empty.
301-Keyboard Error	None	Keyboard failure.	Reconnect keyboard with computer turned off. Check connector for bent or missing pins. Ensure that none of the keys are depressed. Replace keyboard.
304-Keyboard or System Unit Error	None	Keyboard failure.	Reconnect the keyboard with computer turned off. Ensure that none of the keys are depressed. Replace keyboard. Replace system board.
401-Parallel Port 1 Address Assignment Conflict	2S	IRQ address conflicts with another device.	Reset the IRQ.

* L = Long, S = Short

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
402-Monochrome Adapter Failure	1L, 2S	Monochrome display controller.	Replace monochrome display controller.
403-Parallel Port 3 Address Assignment Conflict	2S	IRQ address conflicts with another device.	Reset the IRQ.
404-Parallel Port Address Conflict Detected	2S	Both external and internal ports are assigned to parallel port X.	Remove any parallel expansion cards. Clear CMOS. Reconfigure card resources and/or run Computer Setup (F10 Setup).
410-Audio Interrupt Conflict	2S	IRQ address conflicts with another device.	Reset the IRQ.
411-Network Interface Card Interrupt Conflict	2S	IRQ address conflicts with another device.	Reset the IRQ.
501-Display Adapter Failure	1L, 2S	Graphics display controller.	Reseat the graphics card (if applicable). Clear CMOS. Verify that the monitor is attached and turned on. Replace the graphics controller.
510-Splash Screen image corrupted	None	Splash Screen image has errors.	Install latest version of ROMPaq to restore image.
511-CPU, Rear, or Front Fan not detected	None	Fan is not connected or may have malfunctioned.	Reseat fan cable. Replace the fan.
512-Chassis fan not detected	None	Fan is not connected, may have malfunctioned, or fan driver on system board is not working.	Reseat fan cable. Replace the fan. Replace system board.
601-Diskette Controller Error	None	Diskette controller circuitry or floppy drive circuitry incorrect.	Run Computer Setup (F10 Setup). Check and/or replace cables. Clear CMOS. Replace diskette drive. Replace the system board.
602-Diskette Boot Record Error	None	Diskette in drive A not bootable.	Replace the diskette.

* L = Long, S = Short

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
605-Diskette Drive Type Error	2S	Mismatch in drive type.	Run Computer Setup (F10 Setup) or Windows NT, Windows 95, or Windows 98 utilities. Disconnect any other diskette controller devices (tape drives). Clear CMOS.
610-External Storage Device Failure	None	External tape drive not connected.	Reinstall tape drive or press F1 and allow system to reconfigure without the drive.
611-Primary Floppy Port Address Assignment Conflict	2S	Configuration error.	Run Computer Setup (F10 Setup). Remove expansion cards. Clear CMOS.
612-Secondary Floppy Port Address Assignment Conflict	2S	Configuration error.	Run Computer Setup (F10 Setup). Remove expansion cards. Clear CMOS.
660-Display Cache is Detected Unreliable	None	Integrated video controller display cache not working properly and will be disabled.	Replace system board if minimal video degrading is an issue.
912-Computer Cover Has Been Removed Since Last System Start Up	None		No action required.
914-Hood Lock Coil is not Connected	None	Hood lock mechanism is missing or not connected.	Reconnect or replace hood locking mechanism. Reseat or replace hood locking mechanism cable.
916-Thermal Sensor from Processor Heatsink is not Connected.	None	Processor heatsink cable not connected to system board.	Reseat or replace the processor heatsink cable going to the system board.
917-Expansion Riser not Detected	None	Riser board not seated or not installed.	Install riser board if missing or remove and reseat to ensure good connection.

* L = Long, S = Short

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
1151-Serial Port 1 Address Conflict Detected	2S	Both external and internal serial ports are assigned to COM1.	Remove any Comm port expansion cards. Clear CMOS. Reconfigure card resources and/or run Computer Setup (F10 Setup). Run Computer Setup or Windows utilities.
1152-Serial Port 2 Address Conflict Detected	2S	Both external and internal serial ports are assigned to COM2.	Remove any Comm port expansion cards. Clear CMOS. Reconfigure card resources and/or run Computer Setup (F10 Setup). Run Computer Setup or Windows utilities.
1155-Serial Port Address Conflict Detected	2S	Both external and internal serial ports are assigned to same IRQ.	Remove any Comm port expansion cards. Clear CMOS. Reconfigure card resources and/or run Computer Setup (F10 Setup).Run Computer Setup or Windows utilities.
1201-System Audio Address Conflict Detected	2S	Device IRQ address conflicts with another device.	Reset the IRQ.
1202-MIDI Port Address Conflict Detected	2S	Device IRQ address conflicts with another device.	Reset the IRQ.
1203-Game Port Address Conflict Detected		Device IRQ address conflicts with another device.	Reset the IRQ
1611- Fan failure detected	None	Chassis fan not connected to the system board.	Reconnect the fan. Replace the fan. Replace the system board.

* L = Long, S = Short

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
1720-SMART Hard Drive Detects Imminent Failure	None	Hard drive is about to fail. (Some hard drives have a firmware patch that will fix an erroneous error message.)	Determine if hard drive is giving correct error message. Run the Drive Protection System test available. Apply firmware patch if applicable (see www.compaq.com\support\techpubs\customer_advisories). Back up contents and replace hard drive.
1721-SMART SCSI Hard Drive Detects Imminent Failure	None	Hard drive is about to fail. (Some hard drives have a firmware patch that will fix an erroneous error message.)	Determine if hard drive is giving correct error message. Run the Drive Protection System test available. Apply firmware patch if applicable. Back up contents and replace hard drive.
1771-Primary Disk Port Address Assignment Conflict	2S	Internal and external hard drive controllers are both assigned to the primary address.	Remove any disk controller expansion cards. Clear CMOS. Reconfigure card resources and/or run Computer Setup (F10 Setup).
1772-Secondary Disk Port Address Assignment Conflict	2S	Internal and external hard drive controllers are both assigned to the primary address.	Remove any disk controller expansion cards. Clear CMOS. Reconfigure card resources and/or run Computer Setup (F10 Setup).
1780-Disk 0 Failure	None	Hard drive/format error.	Run Computer Setup (F10 Setup). Clear CMOS. Check cables/jumper settings. Run hard drive diagnostics. Disconnect additional drives. Run the Drive Protection System test if available. Replace the hard drive.

* L = Long, S = Short

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
1781-Disk 1 Failure	None	Hard drive/format error.	Run Computer Setup (F10 Setup). Clear CMOS. Check cable seating/jumper settings. Run hard drive diagnostics. Disconnect additional drives. Run the Drive Protection System test if available. Replace the hard drive.
1782-Disk Controller Failure	None	Hard drive circuitry error.	Run Computer Setup (F10 Setup). Clear CMOS. Check cable seating /jumper settings. Run hard drive diagnostics. Disconnect additional drives. Run the Drive Protection System test if available. Check www.compaq.com\support\techpubs\customer_advisories for possible changes when using Windows NT4.0 Service Pack 4. Replace the hard drive. Replace the system board.

* L = Long, S = Short

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
1790-Disk 0 Failure	None	Hard drive error or wrong drive type.	Run Computer Setup (F10 Setup). Clear CMOS. Check cable seating /jumper settings. Run hard drive diagnostics. Disconnect additional drives. Confirm that drive is supported on this computer (large drive ROM support). Run the Drive Protection System test if available. Replace the hard drive. Replace the system board.
1791-Disk 1 Failure	None	Hard drive error or wrong drive type.	Run Computer Setup (F10 Setup). Clear CMOS. Check cable seating /jumper settings. Run hard drive diagnostics. Disconnect additional drives. Confirm that drive is supported on this computer (l arge drive ROM support). Run the Drive Protection System test if available. Replace the hard drive. Replace the system board.
1792-Secondary Disk Controller Failure	None	Hard drive circuitry error.	Run Computer Setup (F10 Setup). Clear CMOS. Check cable seating /jumper settings. Run hard drive diagnostics. Disconnect additional drives. Run the Drive Protection System test if available. Replace the hard drive.

* L = Long, S = Short

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
1793-Secondary Controller or Disk Failure	None	Hard drive circuitry error.	Run Computer Setup (F10 Setup). Clear CMOS. Check cable seating /jumper settings. Run hard drive diagnostics. Disconnect additional drives. Run the Drive Protection System test if available. Replace the hard drive.
1800-Temperature Alert	None	Internal temperature exceeds specification.	Check that computer air vents are not blocked and cooling fan is running. Verify processor speed selection. Replace the processor. Replace the system board.
1801-Microcode Patch Error	None	Processor not supported by ROM BIOS.	Upgrade BIOS to proper version.
Audible	1L, 3S	System ROM is bad; system is running in Failsafe Boot Block mode.	Reflash the ROM using a ROMPaq diskette. Refer to the "Failsafe Boot Block ROM" section of the Software Reference Guide.
Audible	2S	Power-on successful.	None.
Fixed Disk Parameter Table or BIOS Error System Halted	3L	Configuration or hardware failure.	Run Computer Setup and Diagnostic Utilities.
Flashing Caps Lock LED on Keyboard	1L, 2S	Graphics controller not present or incorrectly initialized.	Clear CMOS. If graphics card has been added, remove and reseat. Reset the riser board.
Flashing Num Lock LED on Keyboard (Most models. Blue LED glows on Evo W8000 Workstation.)	1S, 2L	System memory not present.	Check memory module. Remove and reseat memory module. See "Memory" in Appendix F.

* L = Long, S = Short

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
Flashing Scroll Lock LED on Keyboard (Most models. Orange LED glows on Evo W8000 Workstation.)	2L, 1S	System board hardware failure (prior to video).	Replace system board.
Invalid Electronic Serial Number	None	Electronic serial number has become corrupted.	Run Computer Setup (F10 Setup). If Setup already has data in the field or will not allow the serial number to be entered, download and run SP5572.EXE (SNZERO.EXE). Run F10 Setup and try to enter serial number under Security, System ID, then save changes.
Num Lock LED on Keyboard	None	Failed Boot Block.	Reflash the ROM using a ROMPaq diskette.
(Resume = F1 KEY)	None	As indicated to continue.	Press F1.
XXOOOYZZ Parity Check	None	Parity RAM failure.	Run Computer Setup and Diagnostic Utilities.

* L = Long, S = Short

D

Diagnostic Indicator Lights

All indicator lights are not available on all products.

Keyboard Lights (PS/2 Only)

LED	Color	LED Activity	State/Message
Num Lock	Green	Flashing	Memory error
Caps Lock	Green	Flashing	No video
Scroll Lock	Green	Flashing	System board failure, prior to video

Chassis Indicator Lights—Desktop Computers and Workstations

LED	Color	LED Activity	State/Message
Power	Green	On	Computer on
Power	Green	1 blink/second	Normal suspend mode
Power	Green	1 blink/second	Suspend to RAM
Power	None	None	Computer off
Power	Red	On	CPU not installed/fetching code
Power	Red*	4 blinks/second	CPU thermal shutdown
Power	Red*	Computer shuts down	CPU thermal shutdown
Power	Red*	2 blinks 1 second apart followed by 2 second pause then repeat pattern	CPU thermal shutdown
Power	Red	1 blink/second	ROM error
Power	Red	1 blink/2 or more seconds	Power supply overheated
Power and hard drive	Red	On	Riser board not seated

*Varies by model.
**Most models. Blue LED glows on Evo Workstation W8000.

System Board Diagnostic Lights[1]—Desktop Computers and Workstations

Main Power Switch Status	3.3 V_Aux LED	5 V_Aux/ PSON LED	Power Button LED[6]
OFF[2]	ON	ON[4]	OFF
ON[3]	ON	OFF[5]	ON

1. ON and OFF state of LEDs apply only to a good, working system board with AC power applied to the power supply.
2. Power LED is OFF.
3. Power LED is ON. (Green)
4. 5V_Aux is ON.
5. PSON is active = power supply turned ON.
6. All except SFF.

E

Diagnostic Error Codes

Diagnostic error codes occur if the system recognizes a problem while running the Diagnostics program. These error codes help identify possibly defective subassemblies.

Diagnostic error messages consist of three components, AABB-CC, where

AA = Device Code

BB = Subtest Code

CC = Error Code

The following table lists the device codes (AABB-CC) and the subtest code (AABB-CC) covered by Diagnostics Tests. Some codes listed in this table will not apply to the computers described in this manual and will not be detailed in the tables that follow.

Summary of Test Error Codes

Error Code Range	Device Description	Error Code Range	Device Description
0100 - 0199	Processor (P1)	3113 - 3199	Third Processor (P3)
0200 - 0210	Memory	3206 - 3206	Audio System
0301 - 0304	Keyboard	3300 - 3333	Mediavision Spectrum 16
0401 - 0498	Parallel Port		Multimedia
0501 - 0516	Video Display Unit	3400 - 3401	TV Tuner Card Fourth
0600 - 0699	Diskette Drive	4113 - 4199	Processor
0802 - 0824	Monochrome Video Card	5100 - 5130	Plasma Display System
1101 - 1109	Serial Port	5234 - 5240	Advanced Color Graphics (AGC)
1201 - 1210	Modem	6000 - 6089	Network Card
1700 - 1799	Hard Drive	6500 - 6599	SCSI Hard Drives
1800 - 1823	CD-ROM	6600 - 6699	CD-ROM Drives
1900 - 1906	Tape Drive	6700 - 6799	SCSI Tape Drives
2113 - 2199	Second Processor (P2)	7000	Server Manager/R Card
2402 - 2480	Enhanced Color Graphics (ECG/VGA)	8601	Auxiliary Input Interface
		8700 - 8702	Game Port
2502	Pen/Digitizer		

The remaining tables list possible error codes (AABB-CC), descriptions of each error condition, and recommended actions to resolve the error condition.

Retest the system after completing each step. If the problem has been resolved, do not proceed with the remaining steps.

For assistance in the removal and replacement of a particular subassembly, see the "Removal and Replacement Procedures" chapter in this manual.

Microprocessor

Error Code	Description	Recommended Action
0101-xx	CPU test failed.	The following steps apply to 0101-xx through 0102-xx:
0102-xx	Coprocessor error.	1. Run Computer Checkup or Computer Setup and retest. 2. Replace processor and retest. 3. Replace the system board and retest.
0103-xx	DMA controller failed.	The following step applies to 0103-xx through 0106-xx:
0104-xx	Interrupt controller failed.	Replace the system board and retest.
0105-xx	Port error.	
0106-xx	Keyboard controller self-test failed.	
0107-xx	CMOS RAM test failed.	The following steps apply to 0107-xx through 0109-xx:
0108-xx	CMOS interrupt test failed.	1. Replace the battery/clock module and retest.
0109-xx	CMOS clock test failed.	2. Replace the system board and retest.
0110-xx	Programmable timer test failed.	3. Replace the system board and retest.
0113-01	Protected mode test failed.	Replace the system board and retest.
0114-01	Speaker test failed.	Verify the speaker connection. Replace speaker (if applicable) and retest. Replace the system board and retest.
0199-xx	Installed devices test failed.	Check system configuration. Verify cable connections. Check switch settings. Run Diagnostics utility. Remove all devices except processor and replace one-at-a-time until a failure occurs. Replace the system board.

Memory

Error Code	Description	Recommended Action
0200-xx	Machine ID test failed.	Reinsert memory modules and retest.
0202-xx	System ROM checksum failed.	The following steps apply to 0202-xx through 0212-xx:
0203-xx	Write/read test failed.	1. Remove one memory module at a time until the error message stops.
0204-xx	Address test failed.	2. Replace other removed modules one at a time, testing each to ensure the error does not return.
0205-xxx	Walking 1s test failed.	3. Replace defective modules.
0209-xxx	RAM long test failed.	4. If error continues, replace system board and retest.
0211-xx	Random pattern test failed.	
0212-xxx	Cache test failed.	
0214-xx	Noise test failed.	The following steps apply to 0214-xx through 0215-xx:
0215-xx	Random address test failed.	1. Remove one memory module at a time until the error message stops. 2. Replace other removed modules one at a time, testing each to ensure the error does not return. 3. Replace the system board and retest.

Keyboard

Error Code	Description	Recommended Action
0300-xx	ID test failed.	The following steps apply 0300-xx through 0304-xx:
0301-xx	Self-test/interface test failed.	1. Check the keyboard connection. If disconnected, turn the computer off and connect the keyboard.
0302-xx	Individual key test failed.	2. Replace the keyboard and retest.
0304-xx	Repeat test failed.	3. Replace the system board and retest.

Holding any key down during the boot-up sequence causes the Basic Input Output System (BIOS) to beep, as a warning of possible keyboard problems. Wait until after the system has booted, then press the Num Lock key. If the Num Lock light on the keyboard toggles on and off with each press of the key, the keyboard is functioning properly.

Parallel Port

Error Code	Description	Recommended Action
0401-xx	Failed or not connected.	The following steps apply to 0401-xx through 0403-xx:
0402-xx	Printer port test failed.	1. Connect the printer.
0403-xx	Pattern test failed.	2. Check power to the printer.
		3. Install the loop-back connector and retest.
		4. Replace system board and retest.

Diskette Drive

Error Code	Description	Recommended Action
0600-xx	ID drive types test failed.	The following steps apply to 0600-xx through 0698-xx:
0601-xx	Format failed.	1. Replace the diskette media and retest.
0602-xx	Read test failed.	2. Reseat and/or replace the diskette power and signal cables and retest.
0603-xx	Write, read, compare test failed.	3. Replace the diskette drive and retest.
0604-xx	Random seek test failed.	4. Replace the system board and retest.
0605-xx	ID media test failed.	
0606-xx	Speed test failed.	
0609-xx	Diskette reset controller failed.	
0610-xx	Change line test failed.	
0697-xx	Diskette type error.	
0698-xx	Diskette drive speed not within limits.	
0699-xx	Diskette drive/media error.	1. Replace the diskette media and retest.
		2. Run Computer Setup and TEST.

Serial Port

Error Code	Description	Recommended Action
1101-xx	Serial port test failed.	1. Run Computer Setup or Windows NT, Windows 98/2000/ME utilities. 2. Replace the system board and retest.

Modem Communications

Error Code	Description	Recommended Action
1201-xx	Internal test failed.	The following steps apply to 1201-xx through 1210-xx:
1203-xx	External termination test failed.	1. Disconnect from the phone line and retest.
1204-xx	Auto originate test failed.	2. Check the phone number.
1205-xx	Auto answer test failed.	3. Check the modem line.
1210-xx	Direct connect test failed.	4. Replace the modem and retest.

Hard Drive

Error Code	Description	Recommended Action
1701-xx	Format test failed.	The following steps apply to 1701-xx through 1736-xx:
1702-xx	Read test failed.	1. Run Computer Setup and verify drive type.
1703-xx	Write/read/compare test failed.	2. Reseat or replace the hard drive signal and power cables and retest.
1704-xx	Random seek test failed.	3. Clear CMOS.
1705-xx	Controller test failed.	4. Run the hard drive DPS test.
1708-xx	Format bad track test failed.	5. Replace the hard drive and retest.
1710-xx	Park head test failed.	6. Replace the system board and retest.
1715-xx	Head select test failed.	
1716-xx	Conditional format test failed.	
1717-xx	ECC* test failed.	
1719-xx	Power mode test failed.	
1724-xx	Network preparation test failed.	
1736-xx	Monitoring test failed.	

*Error Correction Code

Tape Drive

Error Code	Description	Recommended Action
1900-xx	ID test failed.	The following steps apply to 1900-xx through 1910-xx
1901-xx	Servo test failed.	1. Replace the tape cartridge and retest.
1902-xx	Format or format verification test failed.	2. Reseat and/or replace the signal cable and retest.
1903-xx	Sensor test failed.	3. Check the switch settings on the adapter card (if applicable).
1904-xx	BOT/EOT test failed.	4. Replace the tape adapter card (if applicable) and retest.
1905-xx	Read test failed.	5. Replace the tape drive and retest.
1906-xx	Write/read/compare failed.	6. Replace the system board and retest.
1910-xx	Tape erase test failed.	

Video

Error Code	Description	Recommended Action
501-xx	Graphics controller test failed.	The following steps apply to 501-xx through 516-xx:
502-xx	Video memory test failed.	1. Replace the monitor and retest.
503-xx	Video attribute test failed.	2. Replace the graphics controller and retest.
504-xx	Video character test failed.	3. Replace the system board and retest.
505-xx	Video 80 × 25 mode 9 × 14 character cell test failed.	
506-xx	Video 80 × 25 mode 8 × 8 character cell test failed.	
507-xx	Video 40 × 25 mode test failed.	
508-xx	Video 300 × 200 mode color set 0 test failed.	
509-xx	Video 320 × 200 mode color set 1 test failed.	
510-xx	Video 640 × 200 mode test failed.	
511-xx	Video screen memory page test failed.	
512-xx	Video gray scale test failed.	
514-xx	Video white screen test failed.	
516-xx	Video noise pattern test failed.	
2401-xx	Graphics controller test failed.	1. Reseat the video card (if applicable) and retest. 2. Replace the video card and retest. 3. Replace the system board and retest.
2402-xx	Memory test failed.	The following steps apply to 2402-xx through 2419-xx:
2403-xx	Attribute test failed.	1. Reseat the video card (if applicable) and retest.
2404-xx	Character set test failed.	2. Run the Configuration and Diagnostics utilities.
2405-xx	80 × 25 mode 9 × 14 character cell test failed.	3. Replace the monitor and retest.
2406-xx	80 × 25 mode 8 × 8 character cell test failed.	4. Replace the video/system board and retest.
2408-xx	320 × 200 mode color set 0 test failed.	
2409-xx	320 × 200 mode color set 1 test failed.	

Video

Error Code	Description	Recommended Action
2410-xx	640 × 200 mode test failed.	
2411-xx	Screen memory page test failed.	
2412-xx	Gray scale test failed.	
2418-xx	ECG/VGC memory test failed.	
2419-xx	ECG/VGC ROM checksum test failed.	
2420-xx	Graphics attribute test failed.	Replace the monitor and retest.
2421-xx	ECG/VGC 640 × 200 graphics mode test failed.	1. Reseat the video card (if applicable) and retest. 2. Replace the video/system board and retest.
2422-xx	ECG/VGC 640 × 350 16 color set test failed.	The following steps apply to 2422-xx through 2456-xx:
2423-xx	ECG/VGC 640 × 350 64 color set test failed.	1. Reseat the video card (if applicable) and retest.
2424-xx	ECG/VGC monochrome text mode test failed.	2. Run the Configuration and Diagnostics utilities.
2425-xx	ECG/VGC monochrome graphics mode test failed.	3. Replace the monitor and retest.
2431-xx	640 × 480 graphics test failed.	4. Replace the video/system board and retest
2432-xx	320 × 200 graphics (256 color mode) test failed.	
2448-xx	Advanced VGA Controller test failed.	
2451-xx	132-column Advanced VGA test failed.	
2456-xx	Advanced VGA 256 Color test failed.	
2458-xx	Advanced VGA BitBLT test.	The following steps apply to 2458-xx through 2480-xx:
2468-xx	Advanced VGA DAC test.	1. Reseat the video card (if applicable) and retest.
2477-xx	Advanced VGA data path test.	2. Replace the video card and retest.
2478-xx	Advanced VGA BitBLT test.	3. Replace the system board and retest.
2480-xx	Advanced VGA Linedraw test.	

Audio

Error Code	Description	Recommended Action
3206-xx	Audio System Internal Error.	Replace the system board and retest.

When Windows 98/2000/ME is installed, changes to ESS sound device configuration do not take effect until the computer is restarted (turned off and on).

Network Interface

Error Code	Description	Recommended Action
6000-xx	ID test failed.	The following steps apply to 6000-xx through 6089-xx:
6014-xx	Configuration test failed.*	1. Run Computer Setup or Windows NT, Windows 95, 98, 2000, or ME utilities.
6016-xx	Reset test failed.*	2. Verify test procedures.
6028-xx	Internal test failed.*	3. Replace the network card, if installed.
6029-xx	External test failed.*	4. Replace the system board.
6054-xx	Configuration test failed.**	
6056-xx	Reset test failed.**	
6068-xx	Internal test failed.**	
6069-xx	External test failed.**	
6089-xx	Open test failed.**	

* Ethernet only.
**Token Ring only.

CD-ROM and DVD-ROM

Error Code	Description	Recommended Action
3301-xx	CD-ROM drive read test failed.	The following steps apply to 3301-xx through 3305-xx and 6600-xx through 6623-xx:
3305-xx	CD-ROM drive seek test failed.	1. Replace the CD media and retest.
6600-xx	ID test failed.	2. Check the jumper settings on the adapter card.
6605-xx	Read test failed.	3. Verify that the speakers are connected.
6608-xx	Controller test failed.	4. Reseat and/or replace the power and signal cables and retest.
6623-xx	Random read test failed.	5. Replace the CD-ROM drive and retest.

Pointing Device

Error Code	Description	Recommended Action
8601-xx	Mouse test failed.	The following steps apply to 8601-xx through 8602-xx: 1. Replace with a working mouse and retest.
8602-xx	Interface test failed.	2. Replace the system board and retest.

Special Error Codes

This section includes the error codes for the following devices:

- SCSI hard drives
- SCSI tape drives
- SCSI PD-CD drives
- All CD-ROM drives

The SCSI error codes consist of three components, AABB-CC, where

AA = Device Name

BB = Test Name

CC = Error Code

For example, a diagnostic error code of 6523-05 indicates that the diagnostics program was testing the hard drive random-read function and received a seek failure. The device is faulty and must be replaced.

Device Names

65XX-XX	Hard Drive
66XX-XX	CD-ROM Drive and PD-CD Drive
67XX-XX	Tape Drive

Test Names

XX00-XX	ID
XX05-XX	Read
XX06-XX	SA/Media
XX08-XX	Controller
XX09-XX	Media erase
XX23-XX	Random read
XX28-XX	Media load/unload

Test Error Codes

Error Code	Description	Recommended Action
XXXX-02	Drive not installed.	Check cable connections.
XXXX-03	Media not in drive.	Check for and install data CD or write-enabled tape in drive.
XXXX-05	Seek failure.	Replace the indicated device.
XXXX-06	Drive timed out.	Replace the indicated device.
XXXX-07	Drive busy.	Replace the indicated device.
XXXX-08	Drive already reserved.	Replace the indicated device.
XXXX-09	Unknown.	
XXXX-10	Unknown.	
XXXX-11	Media soft error.	Replace the indicated device.
XXXX-12	Drive not ready.	Replace the indicated device.
XXXX-13	Media error.	Replace the indicated device.
XXXX-14	Drive hardware error.	Replace the indicated device.
XXXX-15	Illegal drive command.	Replace the indicated device.
XXXX-16	Media was changed.	Replace the indicated device.
XXXX-17	Tape write-protected.	1. Disable write-protect on tape cartridge. 2. Replace tape drive.
XXXX-18	No data detected.	Replace the indicated device.
XXXX-21	Drive command aborted.	Replace the indicated device.
65XX-24	Media hard error.	1. Back up data and perform Surface Analysis to reallocate defect. 2. Replace drive.
66XX-24	Media hard error.	1. Replace current data CD with different data CD. 2. Replace drive.
67XX-24	Media hard error.	1. Ensure correct media type for this tape drive. 2. Replace current tape with new tape. 3. Replace tape drive.
XXXX-25	Unknown.	
XXXX-30	Controller timed out.	Replace the indicated device.
XXXX-31	Unrecoverable error.	Replace the indicated device.
XXXX-32	Controller/drive disconnected.	Replace the indicated device.
XXXX-33	Illegal controller command.	Replace the indicated device.
XXXX-34	Invalid SCSI bus phase.	Replace the indicated device.

Test Error Codes *(Continued)*

Error Code	Description	Recommended Action
XXXX-35	Invalid SCSI bus phase.	Replace the indicated device.
XXXX-36	Invalid SCSI bus phase.	Replace the indicated device.
XXXX-39	Error status from drive.	Replace the indicated device.
XXXX-40	Target timed out.	Replace the indicated device.
XXXX-41	SCSI bus stayed busy.	Replace the indicated device.
XXXX-42	ACK/REQ lines bad.	Replace the indicated device.
XXXX-43	ACK did not deassert.	Replace the indicated device.
XXXX-44	Parity error.	Replace the indicated device.
XXXX-50	Data pins bad.	Replace the indicated device.
XXXX-51	Data line 7 bad.	Replace the indicated device.
XXXX-52	MSG, C/D, and/or I/O lines bad.	Replace the indicated device.
XXXX-53	BSY never went busy.	Replace the indicated device.
XXXX-54	BSY stayed busy.	Replace the indicated device.
XXXX-60	Controller CONFIG-1 register bad	Replace the indicated device.
XXXX-61	Controller CONFIG-2 register bad	Replace the indicated device.
XXXX-65	Media not unloaded.	Replace the indicated device.
XXXX-90	Fain failure.	1. Ensure fan(s) connected. 2. Replace nonfunctional fan(s).
XXXX-91	Over temperature.	1. Ensure proper air flow. 2. Perform required maintenance and cleaning.
XXXX-99	Autoloader reported tapes not loaded properly.	1. Install tape(s) in autoloader tape drive according to test instructions. 2. Change autoloader magazine.

F

Troubleshooting Without Diagnostics

Preliminary Checklist

This section describes some simple, preliminary tests and guidelines for troubleshooting the computer without using the diagnostics.

If you encounter some minor problem with the computer or a software application, go through the following checklist for possible solutions before running any of the diagnostic utilities:

- Are the computer and monitor connected to a working electrical outlet?
- Is the computer turned on?
- Is the green power light illuminated?
- Is the monitor turned on?
- Is the green monitor light illuminated?
- Turn up the monitor brightness and contrast controls if the monitor is dim.
- Press and hold any key. If the system beeps, then the keyboard is operating correctly.
- Check all cables for loose or incorrect connections.
- Reconfigure the computer after installing a non–Plug and Play expansion board or other option, such as a diskette drive.
- Are all of the necessary device drivers installed?
- Have all printer drivers been installed for each application?
- Remove all diskettes from the diskette drives before you turn on the system.
- Are all switches set correctly?
- Is the NIC Remote Wakeup cable (featured on some models) connected between the NIC and the riser/system board?
- Are all memory sockets filled on computers using RIMMs?
- Ensure that memory module types are not mixed on the same system board. The system will not boot if RIMMs and DIMMs are mixed.

Solving Minor Problems

Problem	Possible Solution
Computer will not turn on.	1. Ensure that the computer is properly connected to an external power source and the wall outlet is active. 2. A PCI or ISA card that has been installed is defective. Remove any expansion card that was just installed. 3. Reseat drive power, data, and power supply cables. 4. Disconnect all drive cables and reboot. Add devices back one at a time to isolate problem.
Computer appears locked up and won't turn off when the power button is pressed.	Software control of the power button may not be functional. Press and hold the button for four seconds, then release. This invokes the hardware override for the power button.
Computer date and time display is incorrect.	First, reset the date and time under Control Panel. If the problem persists, the real-time clock (RTC) battery may need to be replaced. Refer to Section 9.1 in this guide. When booting from a network, the PC clock may be reset to that of the server. The PC clock may also change when using other services through the server.
Computer powered off automatically.	1. The unit temperature was exceeded because the unit is in an exceedingly hot environment or the fan is blocked. Let the unit cool down. 2. The fan may not be functioning correctly or the air vents are blocked. 3. The unit temperature was exceeded because the computer was functioning with the cover or side panel removed. Replace cover or side panel, and let the computer cool down. 4. The unit temperature was exceeded because the air baffle is not properly installed to directir flow over the processor.
Insufficient power to the components.	Ensure that both power supply cables are connected to the system board (on some workstations).
Computer appears to pause periodically	Network driver is loaded and no network connection is established. Establish a network connection, or use Computer Setup or Windows Device Manager to disable the network controller.
Cannot remove computer cover or side panel.	1. Smart Lock, featured on some computers, is locked. Unlock the Smart Cover Lock using Computer Setup. 2. The Smart Cover FailSafe Key, a device for manually disabling the Smart Cover Lock, is available from HP. You need the FailSafe Key in cases of forgotten password, power loss, or computer malfunction.
Computer does not boot up and power and hard drive LEDs are blinking.	Ensure that the riser board is properly seated.

Solving Minor Problems *(Continued)*

Problem	Possible Solution
Computer does not boot up and Num Lock LED is blinking; you may hear one short and two long beeps.	Memory may be improperly installed or may be bad.
The Caps Lock LED is flashing;you may hear one long and two short beeps.	The video controller is not present or is incorrectly initialized. Clear configuration memory (CMOS). If a video card has been added, remove and reseat it.
Computer does not boot up and the Scroll Lock LED is flashing; you may hear two long and one short beeps.	System board hardware failure (prior to video). Replace system board.

If the standard keyboard has been replaced with a Universal Serial Bus (USB) keyboard, you will hear the beep sequences mentioned above but will not see the flashing lights.

Diskette Drive

Problem	Possible Solution
Diskette drive light stays on.	1. Diskette is damaged. In Windows 98, 2000, or Me run ScanDisk. Click Start > Programs > Accessories > System Tools > ScanDisk. In Windows NT, right–click Start, click Explore, and select a drive. Select File > Properties > Tools. Under Error-checking, click Check Now. 2. Diskette is incorrectly inserted. Remove the diskette and reinsert. 3. Software program may be damaged. Check the program diskettes. 4. Drive button is not pushed in. Push in drive button. 5. Drive cable is not properly connected. Reconnect drive cable.
Diskette drive cannot write to a diskette.	1. Diskette is not formatted. Format the diskette. 2. Diskette is write-protected. Either use another diskette that is not write-protected or disable the write protection on the diskette. 3. Writing to the wrong drive. Check the drive letter in the path statement. 4. Not enough space is left on the diskette. Use another diskette. 5. Diskette write control is enabled. Check the Removable Media write settings in Computer Setup.
Cannot format diskette.	Invalid media reported. When formatting a diskette in DOS, you may need to specify diskette capacity. For example, to format a 1.44-MB diskette, type the following command at the DOS prompt: FORMAT A: /F:1440

Diskette Drive *(Continued)*

Problem	Possible Solution
Diskette drive cannot read a diskette.	1. Diskette is not formatted. Format the diskette. 2. Using the wrong diskette type for the drive type. Check the drive type and use a compatible diskette. 3. Reading the wrong drive. Check the drive letter in the path statement. 4. Diskette drive has been disabled by Computer Setup, Windows NT, Windows 98, 2000 or Me utilities. Run Computer Setup and enable the diskette drive.
A problem has occurred with a disk transaction.	The directory structure is bad, or there is a problem with a file. In Windows 98, 2000, or Me run ScanDisk. Click Start > Programs > Accessories > System Tools > ScanDisk. In Windows NT, right–click Start, click Explore, and select a drive. Select File > Properties > Tools. Under Error-checking, click Check Now.
Non-system disk message.	The system is trying to start from a nonsystem diskette. Remove the diskette from the drive.
Drive not found.	1. Reseat the diskette drive cable. 2. If a second diskette drive has been installed, follow the computer reconfiguration directions in the "Hardware Installation Problems" section.
System has misidentified the diskette drive type.	If a diskette drive other than a 3.5-inch, 1.44-MB drive has been installed, ensure that the drive type is identified correctly under Computer Setup.

Display

Problem	Possible Solution
Screen is blank.	1. Monitor is not turned on and the monitor light is not on. Turn on the monitor and check that the monitor light is on. 2. Screen save has been initiated. Press any key or move the mouse to light the screen. 3. The cable connections are not correct. Check the cable connection from the monitor to the computer and to the electrical outlet. 4. The brightness need adjusting. Adjust the brightness control. 5. The energy saver feature has been enabled. Press any key or click the mouse button and, if one has been set, type the password. 6. The RGB (Red, Green, Blue) input switch on the back of the monitor is incorrectly set. Set the monitor's input switch to 75 ohms and, if there is a sync switch, set it to External. 7. System ROM is bad and system is running in FailSafe Boot Block mode (indicated by one long beep and three short beeps). Reflash the ROM using a ROMPaq diskette. Refer to "FailSafe Boot Block ROM" in section 3.4.3 of this book. 8. If a fixed-sync monitor is used, be sure that the monitor can accept the same sweep rate as the resolution chosen. 9. Ensure the VGA/BNC selector is properly set.
Graphics colors are wrong.	Either the cabling or the monitor impedance is incorrect. 1. Ensure that the Red, Green, and Blue BNC cables are connected to the corresponding monitor connectors. 2. Be sure the monitor's RGB inputs are set to 75 ohms.
Characters are dim.	1. Adjust the monitor's brightness and contrast controls. 2. Check that the video cable is securely connected to the graphics card and monitor. 3. Set the RGB switch (and sync options, if available) to 75 ohms, with the sync set to External. Refer to the documentation included with the monitor.
Monitor does not function properly when used with the energy saver features.	Monitor without the energy saver feature is being used with energy saver features enabled. Disable the monitor energy saver features.
Blurry display or requested resolution cannot be set.	If the graphics controller was upgraded, the correct display drivers may not be loaded. Install the correct display drivers from the diskette included in the upgrade kit.

Display *(Continued)*

Problem	Possible Solution
The picture is broken up; it rolls, jitters, or blinks.	1. Be sure the monitor cable is securely connected to the computer. 2. In a two-monitor system or if another monitor is in close proximity, move the monitors apart to be sure they are not interfering with the other's magnetic field. 3. Fluorescent lights or fans may be too close to the monitor.
Screen goes blank.	A screen blanking utility may be installed or energy saver features may be enabled. Press any key or type password.
Monitor overheats.	There is not enough ventilation space for proper airflow. Leave at least 3 inches (7.6 cm) of ventilation space. Be sure there is nothing on top of the monitor obstructing the air flow.
Cursor will not move using the arrow keys on the numeric keypad.	The Num Lock key is on. Press the key to turn it off. The Num Lock light should not be on when you want to use the arrow keys.

SCSI

Problem	Possible Solution
System with IDE and SCSI drives will not boot from SCSI hard drive.	The IDE drive needs to be disabled. Under the Computer Setup Advanced menu, disable the primary IDE controller.
System will not boot from a SCSI drive.	1. The SCSI drive is not configured correctly. 2. Ensure that drive cabling and jumpers are set correctly. To boot a SCSI drive, the drive ID number must be set to 0.

Printer

Problem	Possible Solution
Printer will not print.	1. Printer is not turned on and online. Turn the printer on and ensure it is online. 2. Run printer self-test. 3. Reseat both ends of the printer cable. 4. Verify that printer port is enabled in BIOS and in Windows using F10 Setup. 5. Try printing using the DOS command C:\ [printer port]. Where [printer port] is the port address to which the printer is connected. If the printer works, the problem is with the printer driver. Reload the driver. 6. If the computer is on a network, you may not have made the connection to the printer. Make the proper network connections to the printer.
Printer will not turn on.	The cables may not be connected properly. Reconnect all cables and check the power cord and electrical outlet.
Prints garbled information.	1. The correct printer driver for the application are not installed. Install the correct printer driver for the application. 2. The cables may not be connected properly. Reconnect all cables.
Printer is offline.	The printer may be out of paper. Check the paper tray and refill it if empty. Select online.

Hard Drive

The information provided by the diagnostics tests includes: error code, system serial number, drive serial number, drive model, and drive firmware revision. Specific details of the drive failure are not included.

When you run the diagnostics, the test results are stored in a log. After completing the test, you can print this log to a local printer or save it to a file. Alternatively, before running the test, you can configure the test options to send the results to a local printer or file.

Hard Drive

Problem	Possible Solution
Hard drive error occurs.	Hard disk has bad sectors or has failed. Use a utility to locate and block usage of bad sectors. If necessary, reformat the hard disk.
Disk transaction problem.	Either the directory structure is bad or there is a problem with a file. In Windows 98, 2000, or Me run ScanDisk. Click Start > Programs > Accessories > System Tools > ScanDisk. In Windows NT, right–click Start, click Explore, and select a drive. Select File > Properties > Tools. Under Error-checking, click Check Now.
Drive not found (identified).	1. Cable could be loose. Check cable connections. 2. The system may not have automatically recognized a newly installed device. See reconfiguration directions in the "Hardware Installation Problems" section. If system still does not recognize the new device, check to see if the device is listed within Computer Setup. If it is listed, the probable cause is a driver problem. If it is not listed, the probable cause is a hardware problem. 3. Check drive jumper settings. If the drive is a secondary drive that has just been installed on the same controller as the primary drive, verify that the jumpers for both drives are set correctly. 4. Check SCSI IDs to ensure none are duplicated.
Nonsystem disk message.	1. The system is trying to start from a diskette that is not bootable. Remove the diskette from the diskette drive. 2. The system is trying to start from the hard drive but the hard drive may have been damaged. Insert a bootable diskette into the diskette drive and restart the computer. 3. Diskette boot has been disabled in Computer Setup. Run Computer Setup and enable diskette boot.
Second Ultra ATA hard drive does not perform optimally.	The cable is not compatible with the drive type. Reinstall the second Ultra ATA hard drive using an 80-conductor cable.

Audio

Problem	Possible Solution
Sound does not come out of the speaker.	Software volume control is turned down electronically, or CD-ROM volume control on the front or back of the computer is turned down. Double–click on the speaker icon located on the taskbar, then set the volume by adjusting the volume slider. CD or DVD volume control on the front of the computer may be turned down. Increase the volume by turning the volume control dial. External speakers not turned on. Turn on the speakers. External speakers plugged into wrong jacks. Refer to the *Computer User's Guide* or sound card documentation for proper speaker connection. Audio cable not connected. Connect audio cable between CD or DVD drive and the system board.
Noise or silence comes from the speakers or headphones.	Computer may not detect correct speaker/headphone type or output or analog–to–digital auto–sense is not engaged. 1. If using digital speakers with a stereo jack, use the stereo–to–mono adapter to engage the auto–sense feature. 2. If a the stereo–to–mono adapter is not available, use the multimedia device properties to manually switch the audio signal from analog to digital. 3. If the headphones have a mono jack, use the multimedia device properties to manually switch the system to analog out. If you set digital as the Output mode, the internal speaker and external analog speakers will no longer output audio until you switch back to an auto–sense or analog mode. If you set analog as your Output Mode, external digital speakers will not function until you change the output mode back to auto–sense or digital mode.

Hardware Installation

You may need to reconfigure the computer when you add or remove hardware, such as an additional diskette drive. If you install a Plug and Play device, Windows 98, 2000, or Me in most cases will automatically recognize the device and configures the computer. If a third-party Plug and Play device is not recognized, contact the device manufacturer. If you install a non–Plug and Play device, you must reconfigure the computer after completing installation of the new hardware. In Windows 98, 2000, or Me, select the Add New Hardware icon in the Control Panel and follow the instructions that appear on the screen. To reconfigure the computer in Windows NT Workstation 4.0 after installing new hardware, use the utility provided with the hardware.

Hardware Installation

Problem	Possible Solutions
A new device is not automatically recognized as part of the computer system.	1. The computer needs to be reconfigured to recognize the new device. Follow the reconfiguration instructions above. If system still does not recognize the new device, but the device is listed within Computer Setup, use Computer Setup to address any resource conflicts. 2. When the system advised you of changes to the configuration, you did not accept them. Reboot the computer and follow the instructions for accepting the changes. 3. A Plug and Play board may not automatically configure when added if the default configuration conflicts with other devices. Use Windows 98, 2000, or Me Device Manager to deselect the automatic settings for the board and choose a basic configuration that doesn't cause a resource conflict. You can also use Computer Setup to reconfigure or disable devices to resolve the resource conflict. 4. The cables for the new external device are loose or the power cables are unplugged. Check all cables, and check that pins in the cable or connector are not bent down. 5. The power switch for the new external device is not turned on. Turn off the computer, turn on the external device, and then turn the computer on to integrate the new device with the computer. 6. If the drive is a secondary drive that has just been installed on the same controller as the primary drive, verify that the jumpers for both drives are set correctly.
Insufficient power to the components.	Ensure both power supply cables are connected to the system board (some Workstations).
Installed third-party SCSI hard drive adapter not participating in the hard drive ordering sequence provided in F10 Setup and/or is always coming up as the boot device regardless of the predetermined sequence.	The third-party adapter is either not supporting BIOS Boot Specification or the Boot Vector option. A solution is not available.

DVD-ROM and CD-ROM

Problem	Possible Solution
Cannot read compact disc.	1. CD is not properly seated in the drive. Eject the CD, correctly seat it in the drive, then reload. 2. CD has been loaded upside down. Eject the CD, turn it over, then reload.
System will not boot from CD-ROM or DVD drive.	1. The CD-ROM or DVD boot is not enabled through the Computer Setup utility. Run the Computer Setup utility and set the drive priorities. 2. Ensure that drive cabling and jumpers are set correctly. To boot a SCSI drive, the drive ID number must be set to 0.
Cannot eject compact disc (tray-load unit).	CD is not properly seated in the drive. Turn off the computer and insert a thin metal rod into the emergency eject hole and push firmly (a straightened paper clip can be used). Slowly pull the tray out from the drive until the tray is fully extended, then remove the CD.
Cannot eject compact disc (slot-load unit).	1. Remove the drive from the chassis. 2. Remove the front bezel from the drive. 3. Remove the top and bottom drive covers. 4. Release the clamping mechanism to retrieve the CD.
CD-ROM or DVD device is not detected; driver is not loaded.	CD-ROM or DVD drive is not connected properly or not properly terminated. Open the computer and check the drive cable.
Movie will not play in the DVD drive.	Movie may be regionalized for a different country. Refer to the documentation that came with the device.

Processor

Problem	Possible Solution
Computer does not recognize the second processor.	Hardware Abstract Layer (HAL) installed is for a single processor. Install the multi-processor HAL.

Memory

Problem	Possible Solution
System won't boot or does not function properly after installing additional memory modules.	Memory module is not the correct type or speed grade for the system. Replace module with the correct industry-standard device for the computer.
Out of Memory error.	1. Memory configuration may not be set up correctly; check memory configuration using Device Manager. 1. The computer has run out of memory for the application. Check the application documentation to determine the memory requirements.
Memory count during POST is wrong.	Memory modules may not have been installed correctly or incorrect modules may have been used. On system boards having integrated Intel video that use 1 MB of memory for video it is normal for POST to have the memory count 1 MB short.
Insufficient memory error during operation.	1. Too many Terminate and Stay Resident programs (TSRs) are installed. Delete any unnecessary TSRs. 2. There is not enough memory for the application. Check the memory requirements for the application or add more memory.
Unit is on but there is no video and the power LED is blinking red.	Memory is not installed correctly and system is not booting. Reinstall memory modules.

Network

Some common causes and solutions for network problems are listed in the following table. These guidelines do not discuss the process of debugging network cabling.

Network

Problem	Possible Solution
The Remote Wakeup feature is not functioning.	1. The feature is not available when using an AUI network connection; use an RJ-45 network connection. 2. Remote Wakeup is not enabled. Use the network control application to enable Remote Wakeup.
Network driver does not detect network controller.	Network controller is disabled. Run Computer Setup and enable network controller.
Network status link light does not turn on or flashes.	1. No active network is detected. Check cabling and network equipment for proper connection. 2. Network connection is not set up properly. Use the network control application to verify that the device is working properly. 3. System is configured for AUI connection; link LED does not apply to AUI connections. 4. Network driver is not properly loaded. Reinstall network drivers. 5. System cannot autosense the network. Disable autosensing capabilities and force the system into the correct operating mode.
Diagnostics reports a failure.	Refer to www.hp.com/support/files for the latest version of diagnostics. 1. The cable is not securely connected or is attached incorrectly. Ensure that the cable is securely attached to the network connector and that the other end of the cable is securely attached to the correct device. 2. There is a problem with the cable or a device at the other end of the cable. Ensure that the cable and device at the other end are operating correctly. 3. The network controller is defective. Replace the controller or the system board. 4. Network controller interrupt is shared with an expansion board. Under the Computer Setup Advanced menu, change the resource settings for the board.

Network *(Continued)*

Problem	Possible Solution
Diagnostics passes, but the computer does not communicate with the network.	1. Network drivers are not loaded, or driver parameters do not match current configuration. Make sure the network drivers are loaded and the driver parameters match the configuration of the network controller. 2. The network controller is not configured for this computer. In Windows 98/2000/Me/Windows NT, select the Network icon at the Control Panel. 3. Network controller interrupt with an expansion board. Under the Computer Setup Advanced menu, change the resource settings for the board.
Network controller stopped working when an expansion board was added to the computer.	1. Network drivers are not loaded or driver parameters do not match the current configuration. Make sure that the drivers are loaded and that the driver parameters match the configuration of the network controller. 2. The cable is not securely connected or is attached incorrectly. Ensure that the cable is securely attached to the network connector and that the other end of the cable is securely attached to the correct device. 3. Network controller interrupt is shared with an expansion board. Under the Computer Setup Advanced menu, change the resource settings for the board. 4. Network drivers were accidentally deleted when the drivers for the new expansion board were installed, or the files containing the network drivers are corrupted. Reinstall the network drivers, using backup diskettes.
Network controller stopped working without apparent cause.	1. The files containing the network drivers are corrupted. Reinstall the network drivers, using backup diskettes or the Restore CD. 2. The cable is not securely connected or is attached incorrectly. Ensure that the cable is securely attached to the network connector and that the other end of the cable is securely attached to the correct device. 3. The network controller is defective. Replace the network controller or system board.
Cannot connect to the network server when attempting Remote System Installation.	The network controller is not configured properly. Run Computer Setup and modify the Embedded NIC Settings.
System Setup utility reports unprogrammed EPROM.	1. Boot the workstation without the network drivers using a system boot diskette and reconfigure the controller. 2. Replace the controller. 3. Replace the system board.

Resolving Audio Hardware Conflicts

Hardware conflicts occur when two or more peripheral devices contend for the same signal lines or channels. Conflicts between the audio interface and another peripheral device may be due to the settings of the base I/O addresses, interrupts, or DMA channels. The audio interface typically has the following settings:

Item	Setting
Base I/O address	220H
FM Synthesizer I/O address	388-38Bh
Interrupt	IRQ 5
8-bit DMA	Channel 1

To resolve hardware conflicts:

1. Change the hardware settings of your audio card or the peripheral card in your system if the peripheral card is using the audio interface setting. You can change settings for integrated audio using Computer Setup.
2. If you are unsure of the settings of the peripheral cards, you can isolate the source of the problem by temporarily removing all cards and other essential cards such as the disk controller. After that, add the cards back one at a time until the card that is causing the conflict is found.

Troubleshooting Using hp Intelligent Manageability Features

The Local Alert Pop-Up Dialog notifies you of an impending or actual hardware failure. If the computer is connected to a network and the HP Insight Management Agents are installed and configured, a Simple Network Management Protocol (SNMP) trap (message) is sent to the specified SNMP-compliant management application.

The Local Alert Pop-Up Dialog also tells you the steps you need to take prior to a hardware failure to avoid loss of data and damage to the computer. The system administrator can create a customized action message that might include contact telephone or pager numbers.

To close the Local Alert Pop-Up Dialog, click the Close button. To retrieve fault information after closing the dialog, run HP Insight Personal Edition.

For more detailed information, refer to the online *Intelligent Manageability Guide.*

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System Board and Riser Board Reference Designators

These reference designators are used on most but not all hp system and riser boards.

Designator	Component
CR1	LED - 3.3V Aux
CR2	LED - Power button press
CR3	LED - PS_ON, 5.5V Aux
CR34	Power ON LED
CR35	Hard drive activity LED
E49	Clear Password header
E50	CMOS header
E51	Video pass-through header
J6	BNC
J7	RJ-45 Jack
J8	IEEE 1394
J9	Stacked RJ45/Dual USB connector
J10 - 19	ISA slots
J20 - 29	PCI slots
J30	Riser board socket
J31 - J35	Device bay connectors
J36	AC97 connector
J37	Primary SCSI connector
J38	Secondary SCSI connector
J39	Stacked parallel/SCSI connector
J40	AGP slot
J50	First parallel port
J51	Second parallel port
J52	Double-stacked parallel port Top Port B Bottom Port A
J53	Parallel port over single Serial Port
J54	Parallel port over Serial Port and Video Port
J55	Parallel port over dual VGA ports
J66	Keyboard connector (Closest to monitor connector)
J67	Mouse connector
J68	Double-stacked mouse/keyboard connector TopMouse BottomKeyboard

Designator	**Component** *(Continued)*
J69	Video connector
J70	Single USB connector
J71	Secondary single USB jack
J72	Microphone jack
J73	Line-in jack
J74	Line-out jack
J75	Headphone jack
J76	Volume control
J77	Double-stacked headphone/microphone connector TopMicrophone BottomHeadphone
J78	Double-stacked line-in/line-out connector TopLine in BottomLine out
J80	Stacked serial/audio connector
J81	Primary double-stack USB TopPort 2 BottomPort 1
J82	Secondary double-stack USB TopPort 4 BottomPort 3
J83	Triple-stacked audio jack (line in, line out/headphone, microphone)
J113	Video cache connector
P1	P/S connector
P2	Second P/S connector (as required)
P3	Third P/S connector (as required)
P5	Main Power switch and HDD and power LED connector (pins 1-9) and SCSI LED connector (pins 10-11)
P6	Speaker connector
P7	Audio connector (from CD-ROM)
P8	Chassis fan connector
P9	WOL connector (NIC cable)
P10	Diskette drive connector
P11	Second Audio connector
P12	Alert on LAN NIC connector
P15	AUI connector
P20	Primary IDE connector
P21	Secondary IDE (Multibay) connector
P22	Slimline CD-ROM connector
P23	Header for front audio panel
P24	Header for front panel USB

Designator	**Component** *(Continued)*
P25 - P26	Video memory upgrade connector
P27	MultiBay header
P29	SCSI LED connector
P30	Primary serial ATA port
P31	Secondary serial ATA port
P52	Serial port header
P53	First serial port
P54	Second serial port
P55	Double stack serial port Top Serial B Bottom Serial A
P58	Riser edge connector (male-mates with J30)
P70	Processor (CPU) fan header for fansink
P71	Secondary CPU fan header for fansink
P89	Floating serial port /COM port header
P100	ITP connector
P101	Security card connector
P120	Secondary chassis fan header
P124	Hood lock header
P125	Hood sensor header
P216	White box chassis fan
SW1	Processor speed switch
SW2	Security hood switch
SW50	Clear CMOS switch
SW51	Power button switch
XBT1	Battery socket
XMM1	Memory slot. DIMM1 or RIMM1 populated and tested
XMM2 - XMM5	Following memory slots
XU1	Primary processor socket
XU2	Secondary processor socket
XU15	ROM socket

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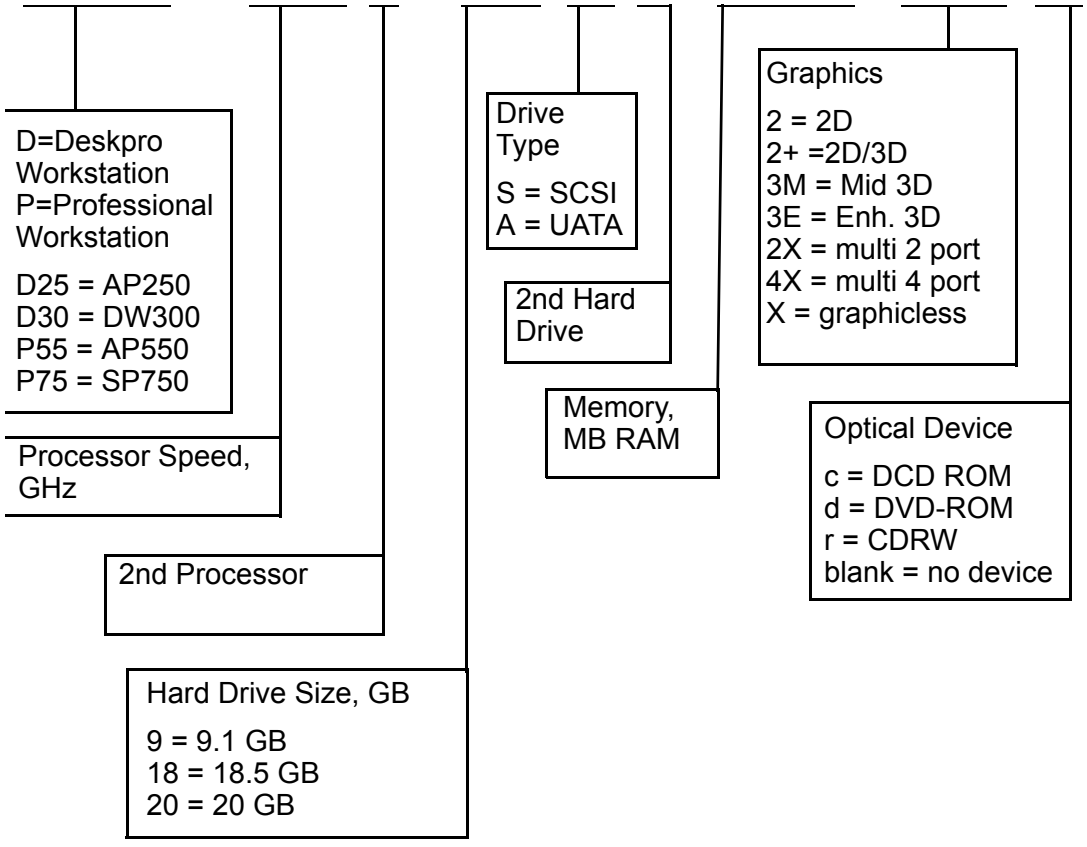
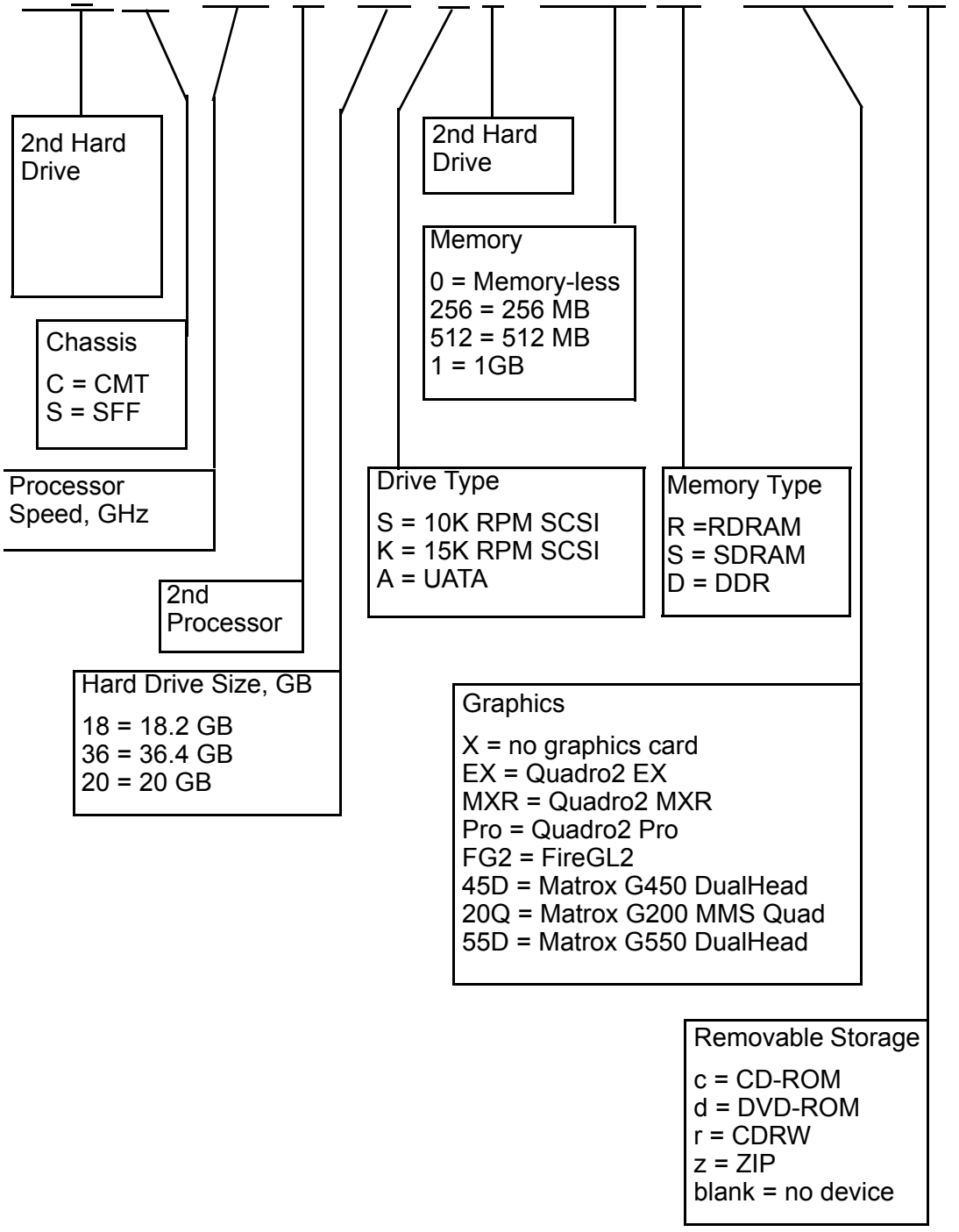
Model Number Naming for Compaq Products

Compaq Deskpro and Professional Workstations

P55/1.4+/40S+/256/2+d

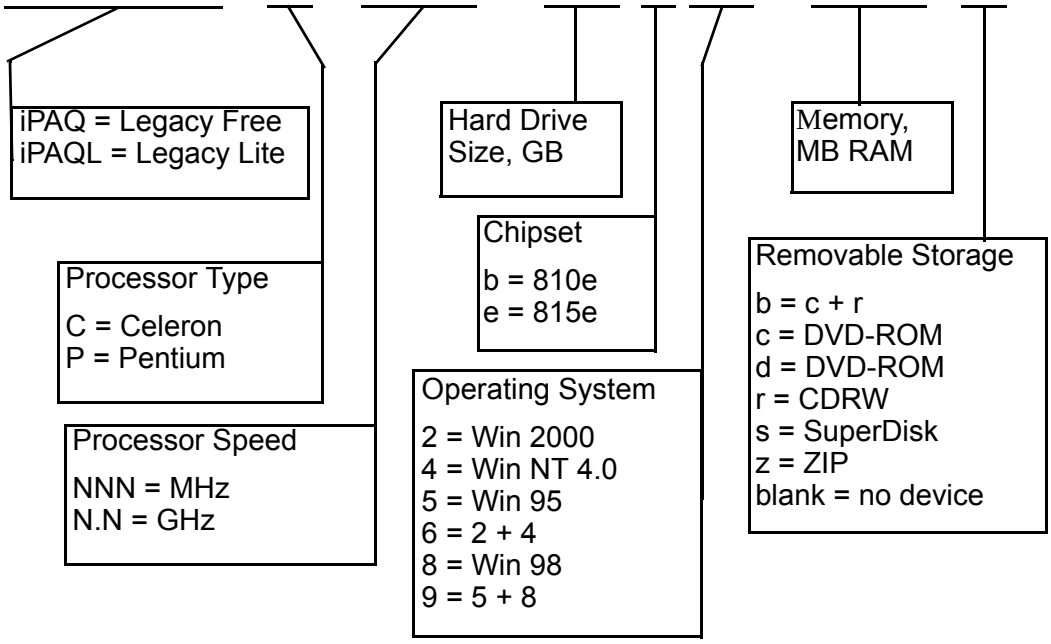


Compaq Evo Workstations



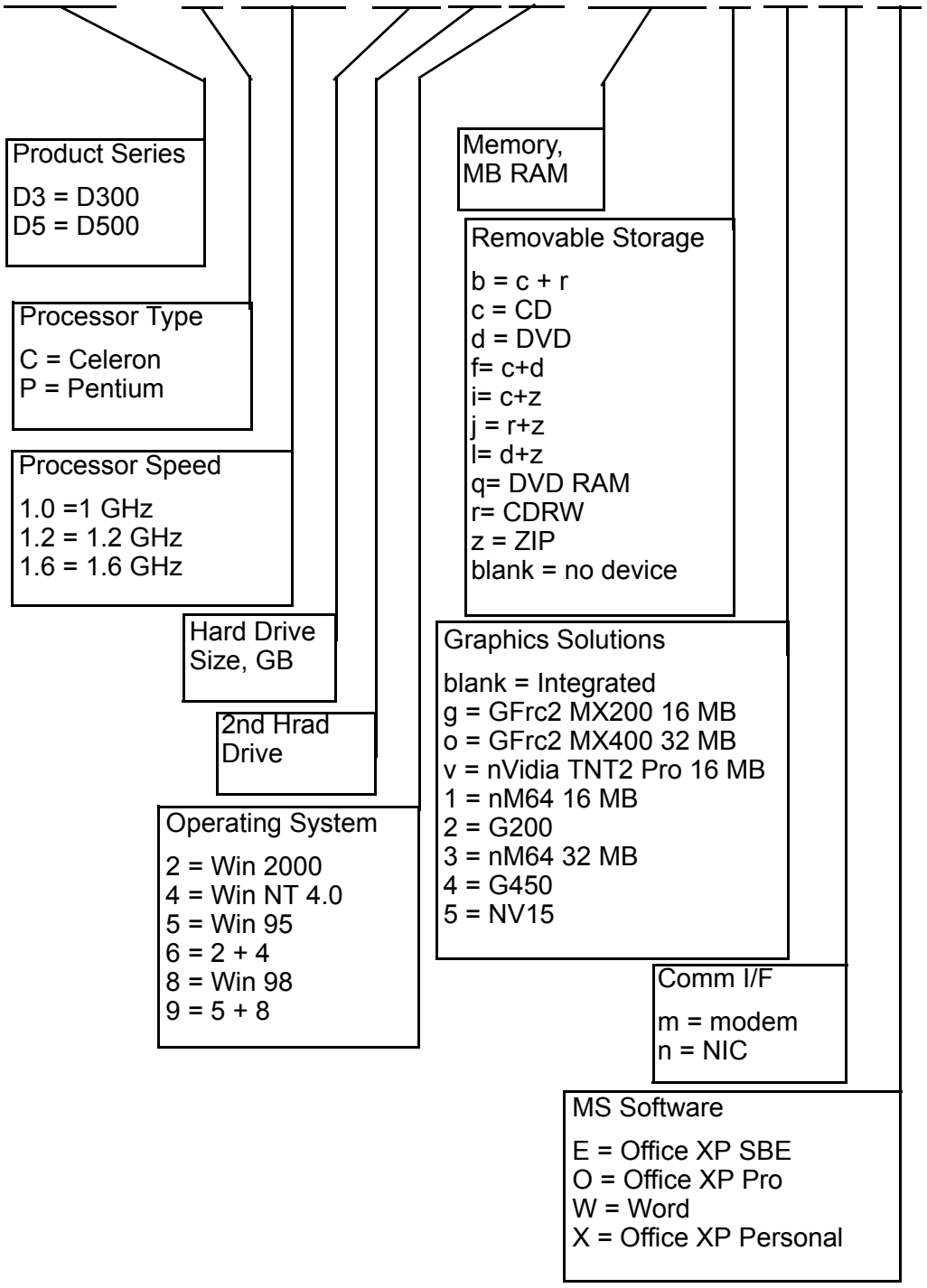
Compaq iPAQ Desktop Personal Computers

iPAQL/P733/10b/2/128c



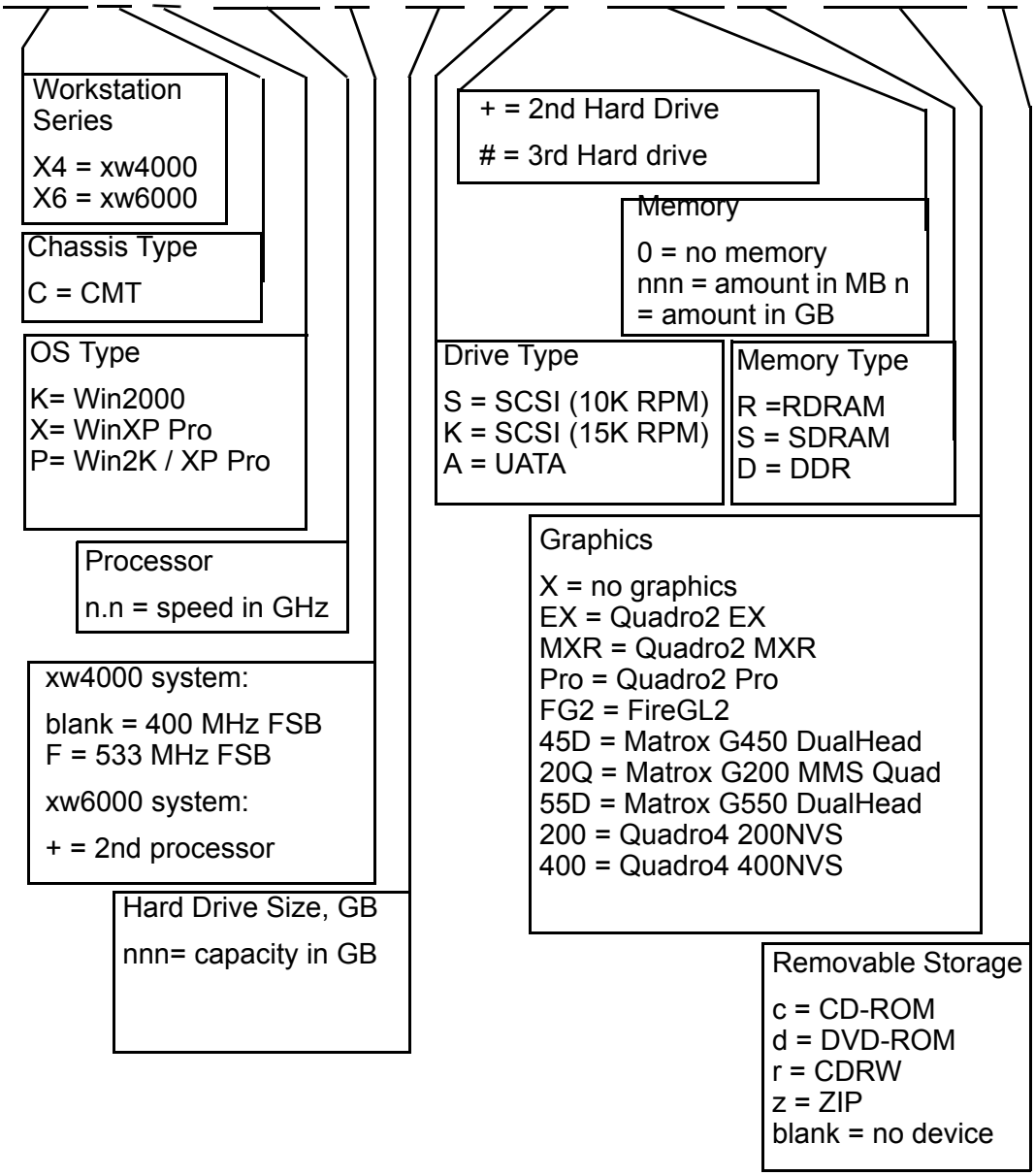
Compaq Evo Desktops

D3sS/P1.0/2.0+/6/128c/vmX



hp Workstations

X4CP/2.6+/40S+/256D/MXRd



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